DRAGON USER



The independent Dragon magazine

75p US$3.25 February 1985

FLEX — THE OS9 ALTERNATIVE

Epson dump

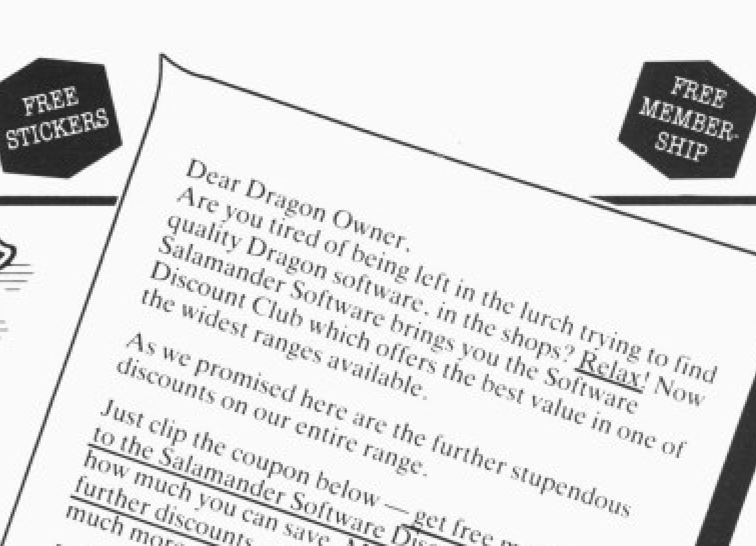
Scramble Scramble

Sideways ROM

Dynafast compiler

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How to submit articles

The quality of the material we can publish in *Dragon User* each month will, to a very great extent depend on the quality of the discoveries that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Contents



Editorial

UNLIKELY THOUGH IT sounds, the future of the Dragon computer now depends, in no small part, on a Spanish TV company.

Eurohard, the Spanish company which took over manufacture of the Dragon from the now defunct Dragon Data, hopes to emulate Acorn by having the Dragon adopted by Spanish TV as their equivalent of the BBC micro.

Eurohard has not been slow to recognise the benefits which have accrued to Acorn from its lucrative association with the BBC. Quite apart from the publicity value, there are considerable advantages in having 'official' backing. In addition, a TV tie-in could help sew up the educational market — one regional education authority in Spain has already plumped for the Dragon.

This is not to say that Eurohard's success in Spain is solely dependent on a TV contract. But, with companies such as Sinclair and Commodore making determined efforts to increase their penetration in European markets, a TV link-up would certainly help.

As far as the UK is concerned, it is obviously important that Eurohard secures its home market, since this will allow the company to devote more of its attention to the existing Dragon User base in this country. A flow of new software and machines will, in turn, help persuade UK retailers that the Dragon is not 'dead' just sleeping.



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BACKGAMMON - DRAGON 32
REVERSI - DRAGON 32
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DOMINOES - DRAGON 32
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Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Carbon microphone

IN REPLY to Darren Cocking's enquiry about attaching microphones to the joystick socket (*Dragon User* November) — I managed this by using a carbon microphone (from a telephone mouthpiece) and so constructed a very simple oscilloscope (non real-time). The circuit is identical to that found in the 'building a lightpen' article in April's issue, with the cell replaced by the carbon microphone.

To improve my oscilloscope, I found it necessary to disassemble and rewrite the machine code joystick routine (locations $BD41 to $BD88) in Ram with some alterations (only reading one of the four potentiometers for instance) that made it much faster. This enabled my program to read a value from 0-63 over 3,900 times a second.

Stephen Jewson
69 Furners Mead
Henfield
W Sussex

Moans and groans

THANK YOU for a useful magazine with lots of tips and handy programs. I am not a games fanatic — I'm a bit too old and I really use my Dragon for more useful purposes, such as helping me check the eight *Times* Portfolio cards I've now acquired from various friends. I think the program is rather too restricted to offer to your readers.

I also prefer to write my own programs rather than buy commercial software. But, I was somewhat disappointed when I tried to purchase some games from my local multi-outlet national retailer for the family's amusement at Christmas. Having perused the columns of your magazine for a couple of months, I found several programs that took my fancy. The advertisements led me to believe they would be available from Boots, John Menzies, etc. As I live near Bath and Bristol, I have the choice of several large stores. Par for the course at Boots was about eight different programs, with Menzies fairly similar.

Now I know Dragon Data was bought by Eurohard, but at least 35,379 people read your magazine and sales of Dragons must have well exceeded that. So, where can I see what I want to buy? I suppose I must order direct and risk the quality. I think the multiple retailers have let us down badly, or are sales of software really so bad?

This brings me on to my next moan. Someone, some years back tried to market his software program and the market was set up for the £6.95 to £7.95 average price of programs. Various efforts have been made over the years to reduce this price, but I suspect they have been largely thwarted by the retailers who insist on their £2-£3 profit. If the average price of software was £3-£5, I feel sure sales would boom.

Finding the programs for your computer on the shop shelf is another problem. Little attention seems to have been given to making particular machine programs readily identifiable. If a standard colour code top or bottom band were used for each system, then finding what you are looking for would be much simpler.

Finally, in the moans and groans section, I would plea for the industry (software) to come clean and indicate more clearly what you can expect to get from the tape inside the wrapper.

P Crooke
Honeybank
Brittens Hill
Paulton
Bristol

Retailers certainly seem to be extremely reluctant to stock any new Dragon software, hence the return to prominence of the mail order business.

A question of intelligence

YOU MAY be interested to know that we recently received the following complaint and have advised the complainant that we will not be pursuing the matter, as in our view, on the facts available to us and in the particular circumstances pertaining to this complaint, there appears not to be a prima facie case for investigation under the terms of the British Code of Advertising Practice.

Subject of complaint: Your mail order advertisement claim for "Artificial Intelligence on the Dragon computer" book (Dragon User).

Basis of complaint: Complainant doubts that artificial intelligence has been invented.

The Advertising
Standards Authority
Brook House
2-16 Torrington Place
London WC1E 7HN

What's my line?

I HAVE recently upgraded from a 32 to a 64 and have two questions which I wonder if anybody can answer. (1) Can the serial port on the 64 handle the 1200 receive/75 transmit baud rate necessary for Prestel? (2) As I seem to have one of the few 64s with the old 32 keyboard, is it possible to buy the significantly improved keyboard on the 64 anywhere?

Douglas Sargeant
74 Voysey Gardens
Basildon
Essex

PS Keep up the good work.

Value for money

FIRST, THANKS for a great magazine. Secondly, just had to write and say that our family of Dragon users have found the new *Pocket Money* software series, being marketed by Microdeal to be fantastic. Great value for £1.99, with great sound effects and superb graphics. I have paid far more for software which hasn't been anywhere near as good. Great stuff, especially *Tea Time*.

Joan MacTavish
46 Florence Street
Llanelli
Dyfed

Madness and the Minotaur

I NOTICED in the November issue of *Dragon User* that you ask if anyone has completed *Madness and the Minotaur*. I have never actually completed it, but have scored 220 points which is close to finishing it. I had two treasures still to collect and I knew where one of them was located (I had one more monster to kill), but not the other.

This is my favourite game and I spend hours engrossed in it (much to the annoyance of my husband). Twice I wrote to Dragon Data when I was stuck over something and got some useful hints from them.

However, one thing has me baffled — I have yet to find any use for the jewelbox. It is not a treasure. I have a feeling it can be opened, but it has never opened for me. Also, I still haven't worked out what makes the pack rat give up its treasure — sometimes it has done so, but I haven't seen any particular reason for it doing so at that particular time. If you can help with these queries, I would be very grateful.

Sue Langmead
287 Gammons Lane
Watford
Herts

Software Top 10

1	(1)	**Hunchback**	Ocean
2	(5)	**Chuckie Egg**	A&F
3	(3)	**Dragon Chess**	Oasis
4	(7)	**Cuthbert in Space**	Microdeal
5	(–)	**Manic Miner**	Software Projects
6	(6)	**Mr Dig**	Microdeal
7	(10)	**Sprite Magic**	Knight Software
8	(2)	**Hungry Horace**	Melbourne House
9	(8)	**Kriegspiel**	Beyond
10	(9)	**Bug Diver**	Mastertronic

Chart compiled by Websters Software

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THE RING OF DARKNESS PART II

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Please note: RETURN OF THE RING is a complete adventure. You need not buy THE RING OF DARKNESS to play it.

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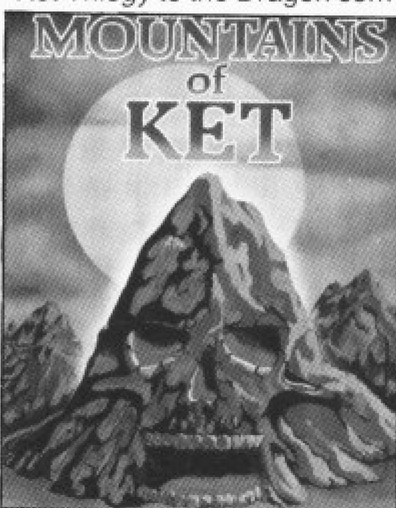
Ket rises to new summit

INCENTIVE SOFTWARE is converting its highly-acclaimed adventure series, the Ket Trilogy, to the Dragon.

The series is being translated from the Spectrum by John Martin and should be available in March.

Mountains of Ket, Temple of Vran and The Final Mission — the three games which make up the *Ket Trilogy* — were launched in 1984 with a £400 video recorder awaiting the first person to completely solve each adventure. Sadly, for Dragon owners, Incentive believe that a winner will probably be announced before Dragon versions of the game are released.

The impetus behind Incentive's decision to convert the *Ket Trilogy* to the Dragon com-



es from the company's recent success with *Back Track*. This program, which was launched in September, has already sold several thousand copies.

The *Ket Trilogy* is likely to cost about £10 and will only be available as a three-pack — the adventures will not be available separately. For a full review of the *Ket Trilogy* see our sister publication *Micro Adventurer*, September 1984.

OS9 accounts package

COMPUSENSE PLANS to release an integrated OS9 accounts package in the next two to three weeks. It will cost approximately £200 and will be available for the Dragon and other OS9 machines such as the Tandy colour computer.

A Flex version of the accounts package is also planned, but it will not be ready for another two months, according to Managing Director Ted Oprychal.

More information from Compusense at 286D Green Lanes, Palmers Green, London N13 5XA.

Go North young man

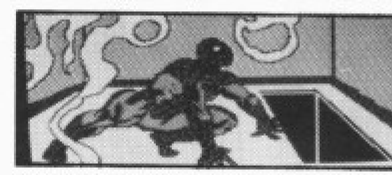
NORTHERN DRAGON users will have the opportunity to see some of the latest software and peripherals at the Pudsey microcomputer show on Saturday, March 16. The show, organised by Northern Premier Exhibitions, will cater for a range of machines including Dragon, Amstrad, Commodore and Sinclair.

Admission costs £1 for adults and 50p for children. The show will be held at the Civic Hall, Dawsons Corner, Pudsey, West Yorkshire, from 10 am to 5 pm.

Spiderman follows Hulk

SPIDERMAN IS here. Marvel Comic's famed super hero has been brought to the Dragon, courtesy of Scott Adam's Adventure International.

The game, which costs



£7.95, is a text only adventure and features some of Spiderman's old foes such as Hydroman and Lizardman. The aim of the game is to collect a number of gems and thus satisfy the chief examiner that you are worthy to do battle with an interstellar enemy, who will appear in a later adventure.

Adventure International has also announced that all its earlier adventures will also appear on the Dragon during January. This covers Scott Adam's adventures 1-13 and the previous Questprobe adventure — The Hulk.

Those people who find adventures difficult to solve



will be glad to know they can buy a hint book with clues to all the Scott Adam's adventures and the Questprobe adventures for £2.99. Details from Adventure International, 85 New Summer Street, Birmingham B19 3TE.

Exit Edna

CABLE SOFTWARE has withdrawn one of its latest games, *Eager Edna*, due to technical problems. However, the company's two other recent additions to its Dragon range, *Fantasy Fight* and *Home Base*, are still available at £6.95 each.

Repeat performance

THE SECOND 6809 Colour Show for Dragon and Tandy users will take place on March 30 and 31. The show will be held at London's Royal Horticultural Halls and admission will cost £2 for adults, £1 for children.

For further details contact the show organisers, Computer Marketplace (Exhibitions) Ltd, 20 Orange Street, London (Tel: 01-930 1612).

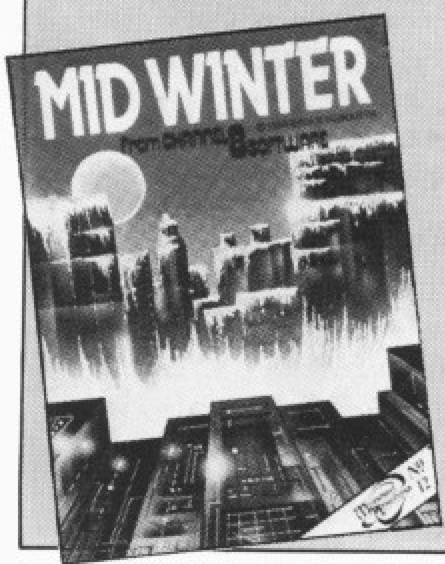
Fruit machine

FRUITY IS a high-resolution fruit machine simulation recently released by London-based Impsoft.

The game, which was originally sold by Dragon Data under a licensing agreement, costs £4.95 and features holds, nudges and gamble wins.

Copies of the game are available mail order from Impsoft, 149 Balham Hill, London SW12 9DJ.

Channel 8 in new ice age

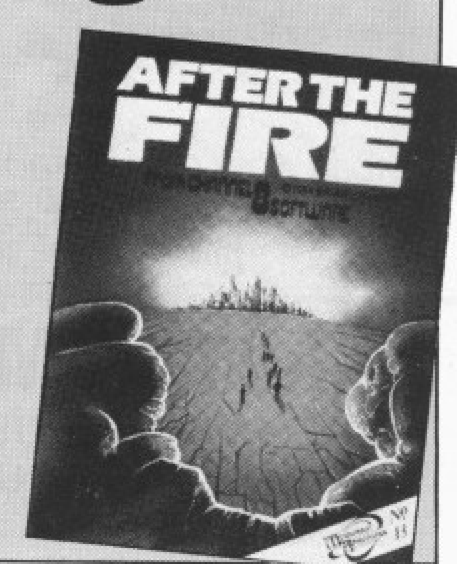


CHANNEL 8 Software is releasing three new adventures for the Dragon — *Midwinter, After the Fire* and *Beyond the Infinite* — in its Mysterious Adventure series. Each game costs £6.95 and should be launched in February.

Norman Perrian of Channel 8 explained that *Midwinter* is set in a modern ice age. The main protagonist has just 12 days in which to find a device to melt the ice, otherwise the world will be locked in ice forever.

After the Fire is set in the aftermath of a nuclear holocaust, while *Beyond the Infinite* takes place in a universe so far distant that the normal laws of time and physics are suspended.

All three games have been duplicated on what Norman Perrian calls "smart tapes". These tapes will work on both the 32 and 64, but the graphics data will only be loaded on a 64. Thus, if you have a 32, the adventures will be text-only, but if you upgrade to a 64 you will have the benefit of graphics as well.

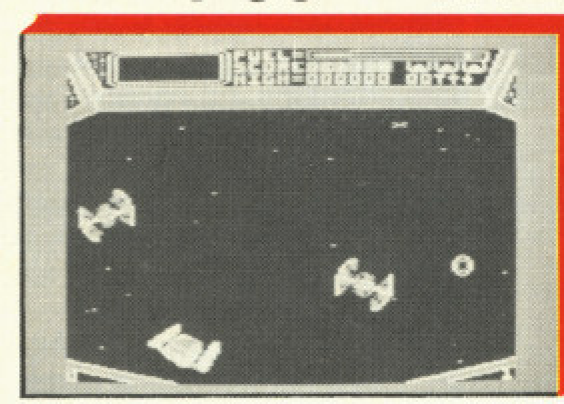




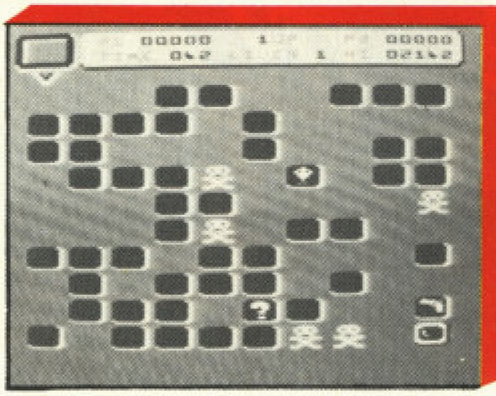
DRAGON GOLD



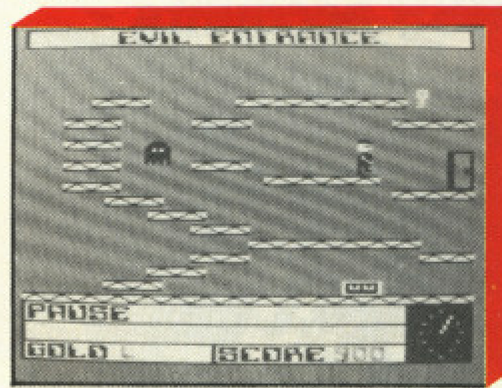
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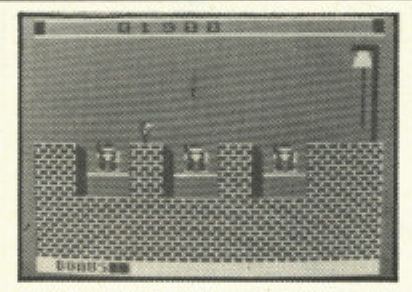
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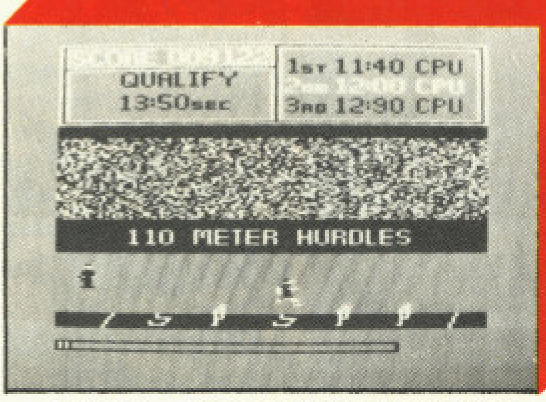
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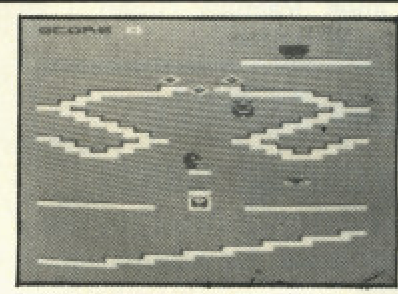
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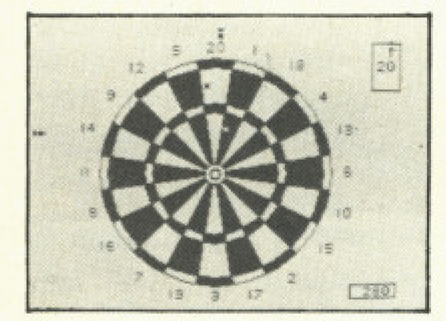
THE BELLS — You have probably read the novel or seen the film — now you can play the game. Rescue Esmeralda from the bell tower. 14 screens of danger for you to challenge. JS/KB. £1.99



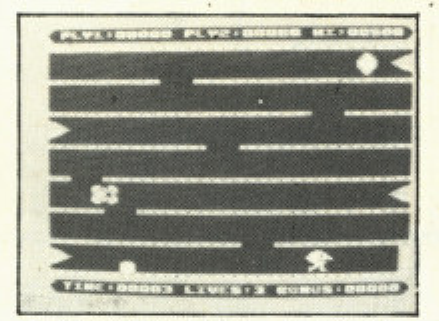
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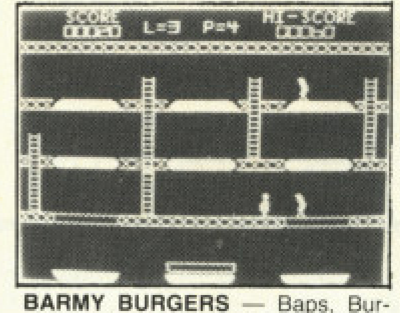
PERILOUS PIT — Deep underground in the crystal mines roams the dreaded Orbis and his cronies, who are hell bent on stopping the attempts of Boris the miner to fill his truck full of crystals — four screens. JS. £1.99



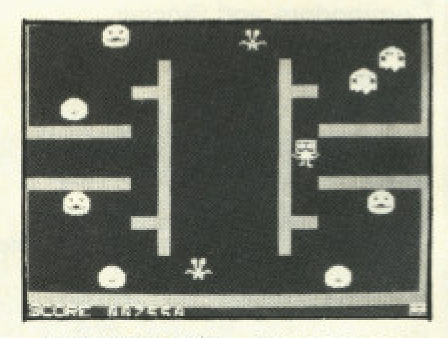
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WE NEED *YOUR* GAME! SEND NOW

Dragonsoft

New software for review should be sent to *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Telepath

Program: Telepath, Snip Software, 171 Maldon Road, Colchester, Essex. **Price:** £7.00.

WHAT, you may ask, have computers got to do with telepathy? The answer comes in the form of a do-it-yourself ESP tester called Telepath. The program starts by asking for your name, and then goes through a rather long title sequence, all printed in lower and upper case on the hi-res screen.



You are next asked if you would like "a short audio history [of telepathy] with graphics demonstration". Pressing "Y" returns a prompt to turn over the tape, which you play while the computer goes through a very nice graphics routine. The "audio history" consists of a man speaking against a background of swishy synthesizer music, and isn't exactly comprehensive, but quite interesting all the same.

Finally the program comes to the ESP test itself. This proved to be rather disappointingly dull, involving seemingly endless repetitions "which card am I thinking of" questions, to which the user presses one of the keys 1-5. The tests consist of groups of 25 "guesses", and at the end of each group the program prints the number of correct guesses in that group, as well as your running total. The user may then continue with the test, start again, lengthen or shorten the test duration, and do a variety of other things including quit.

As there are five cards to choose from, and 25 guesses per group, the program points out that if guessed at random, a non-telepath could expect to score five per group. I scored four.

David Rowntree



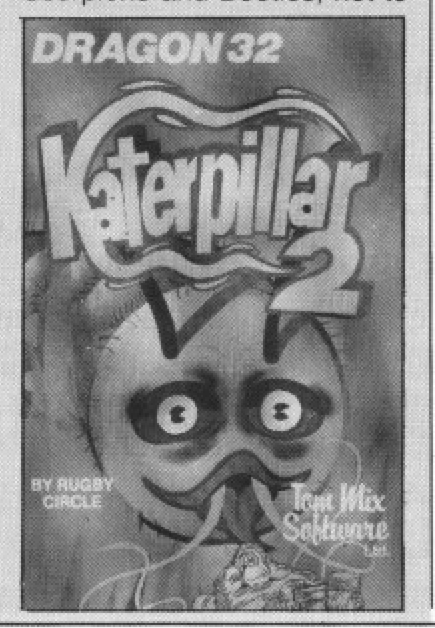
Katerpillar

Program: Katerpillar 2, Microdeal, 41 Truro Road, St Austell, Cornwall. **Price:** £8.00

KATERPILLAR is an arcade-type game for which you will need joysticks to play. It is written in machine code and operates on the high resolution colour mode of PMODE3. This gives a range of colours which it uses to give some variety to the display. The program is obviously well designed, as the game runs at an entertaining speed and fire button responses as well as joystick responses are good.

The basic idea is that the player controls the direction in which the "laser" gun points with the joystick, and fires the gun with the button. Suitable space-invader-type noises are emitted when the gun is fired at a variety of nasties which try to obliterate the player(s). Suitable sound effects are included.

This game can also be played by two players if a pair of joysticks are plugged into the computer. Among the attacking insects are Tarantulas, Scorpions and Beetles, not to



mention the "Katerpillar" itself, of course.

To complicate matters the screen is also covered with mushrooms which influence the behaviour of the katerpillar. Some of the mushrooms are "magic" ones and others may be "killer" types. These have drastic effects upon the katerpillar, which makes the game a lot more interesting.

As you get more expert at this game and progress to the next level, things get steadily more difficult and faster, eventually becoming impossible. This title has been voted a great hit in my house by all ages and definitely gives good value for a high-speed arcade-type game.

Iolo ap Gwynn



Time Police

Program: Time Attack, Tudor Williams, 15 Summerhill Road, Bilston, West Midlands WV14 8RD. **Price:** £7.95.

THIS IS one of those programs that is hard to categorise. It tries to be a game and an educational program, but fails on both counts.

The object of the game part is to destroy the evil Time Police and their computer. The player is first presented with a timeship control panel. A little experimentation reveals that the "up arrow" and "down arrow" keys move the ship forward and backwards through time, and "E" places the player outside the ship. If the latter is selected the computer draws a low-res picture of the timeships' surroundings at the particular year you have arrived at. This usually consists of a group of buildings which, although colourful, doesn't differ much from year to year.

Once outside, providing the player isn't arrested or shot at, there are three courses of action he or she can take. If there is an old timeship lying around, any remaining fuel can be transferred to the player's ship. If the Time Police Computer happens to be outside, the lucky player can shoot it up. If all else fails, pressing "E" takes you back into the timeship to try another year.

The educational part of the program comes in the form of the "Mind Probe". This devious Time Police weapon asks you history questions, and then shoots you if you get them wrong. A lot of effort has obviously gone into this program, the aim of which seems to be to "bring history to life", but it doesn't really succeed, and the overall effect is not up to scratch.

David Rowntree

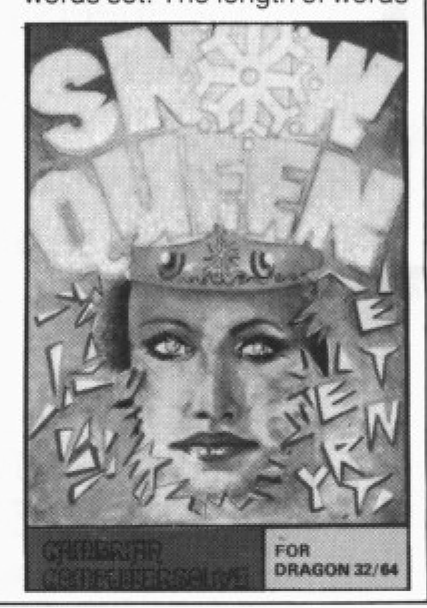


Snow Queen

Program: Snow Queen, Cambrian Computersolve, 15 Derwent Close, Prestatyn, Clwyd LL19 7TT: **Price.** £5.95.

HERE IS yet another supposedly educational type of game, in which the player has to find the letters of a word presented in a confusing mess of black and white squares. The letters to be found are formed using the coarse squares of the low resolution format of Dragon Basic.

A blue coloured rectangle must be placed over the required letter using either a combination of numbers and cursor arrow keys to direct the rectangle to its next position or a joystick to serve the same purpose. This has to be done against the clock and a score is accumulated as the player proceeds through the different words set. The length of words



set can be varied accordingly to the level of difficulty required.

The problems are "set" by the "Snow Queen" whom the player pleases by obtaining the correct answer. The successful player is rewarded by marks and a rather tedious display attempting to imitate a snow crystal.

It appears to me that this program was written for a lesser machine than the Dragon as it does not make use of its graphics capabilities in any way. Although the program has been written in Basic it repeats the tedious drawing of the "snow crystals" each time, using the LINE command.

Much better crystals could have been formed using the DRAW command and then storing them with GET and recalling with PUT. This would have been much better, but would not have overcome the fundamental problem of this program in that the letters to be identified are very difficult to recognise because some of them, especially the "R", "W" and "M" are very odd. My children (ages six, nine and 11) soon gave up on this game.

To summarise therefore, not a bad idea but poorly written and of little appeal to children (mine anyway).

Iolo ap Gwynn



Po go Stick

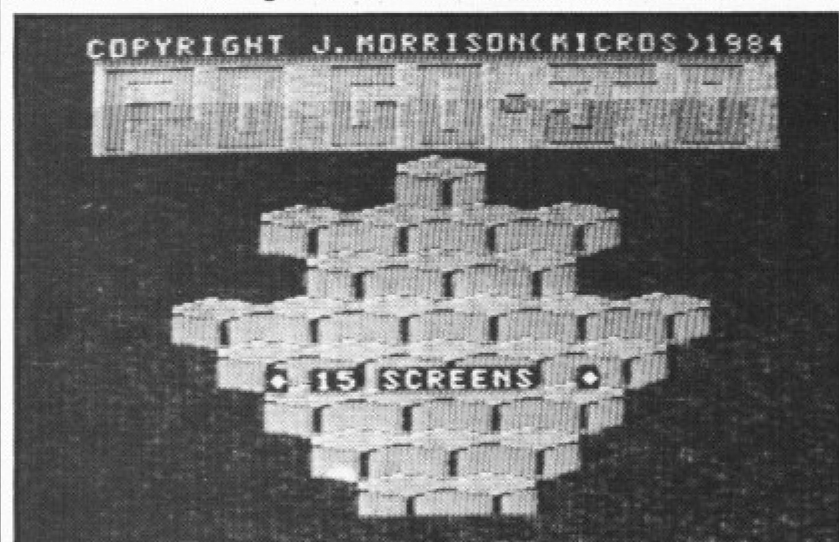
Program: PO-GO-JO, J Morrison Micros, 4 Rein Gardens, Timgley, W Yorks WF3 1JR. **Price:** £3.95.

MORE AND more Cubert clones are appearing for the Dragon these days — "Bloc-head" from Touchmaster, and "Cuber" from Tom Mix to name but two. The latest is from J Morrison Micros.

In case anyone hasn't seen a version of this game, the object is to guide an object, in this case a slinky spring, over a 3D display of joined cubes. Landing on one changes its colour, and changing the colour of all the cubes takes you on to the next level. Falling off the edge or being landed on by one of the nasties loses a life.

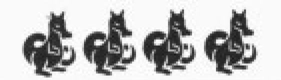
PO-GO-JO is a particularly nice version as it makes excellent use of semi-graphics 24 mode. This allows text and 64 × 192 graphics in all eight colours to be used at once. The display is therefore very colourful, but the graphics are limited to cubes and springs. At least there is a black background which makes a nice change to the usual green that 99 per cent of software seems to use.

Having autorun, the game goes into its demo mode, which shows all 15 different screens (different arrangements of cubes) whilst playing a catchy tune. You are allowed to start at any of the 15 screens on any level (1-4). The level simply determines how many enemy springs will roam over the screen — as these are not intelligent it is not difficult to avoid them using a little care.



As usual with Morrison games now, there is a hall of fame, and an opportunity to enter your name at the start of the game. There is little to choose between various versions of the Cubert game, but as PO-GO-JO is only £3.95, it would seem the best value for money.

Brian Cadge



Dungeon

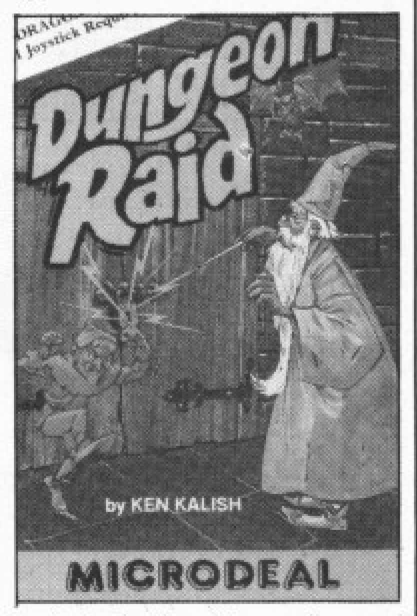
Program: Dungeon Raid, Microdeal, 41 Truro Road, St Austell, Cornwall. **Price:** £8.00

DUNGEON RAID is an example of an arcade adventure game — a type that has grown to be more popular recently. As such it combines the exploration aspects of an adventure game with the quick fingers usually necessary to avoid aliens.

This game starts off by allowing you to choose the background colour and the difficulty level from 1 to 3. You control a small figure who appears to run down a long corridor containing different rooms. This illusion is achieved by keeping the figure still and scrolling the walls up the screen past him.

There is only a limited amount of time to pass through each room, and you must not touch any of the walls. In each room are snakes, oafs, and snappers that you must avoid by use of the joystick. These can be shot by pressing the fire button which releases a blast downwards. This is also the way in which you can open the doors between each room.

To provide some extra interest, inhabiting the labyrinth are "clones" which look just like your own figure. If you shoot these by mistake, you lose a reserve man (if there are any left). Each time you destroy one of the creatures, a type of shock wave bounces



out to both side walls and back, which is probably more of a problem to avoid than the creatures themselves.

John Scriven



Yumping Yack Flash

Program: Yumping Yosser, Knight Software, 93a High Street, Eston, Cleveland TS6 9JD. **Price:** £5.95.

YET ANOTHER "Donkey King" arcade game derivative, but with a difference. It is written in machine code and the quality of the graphics and sound are good. All the instructions you need to play the game are included in the program and you can choose to have them shown or not.

The basic idea is that "Yosser" has to jump from one platform to another in a series of "rooms" to get a key which is needed to open a door on the other side of the room, and a number of jumps away. Just to make things interesting, a variety of monsters wander about and unless you are careful, Yosser will be either munched by a monster, break his head on the roof, or shatter his ankles by falling too far.

The movements can be controlled either by joystick or from the keyboard. All movements are accompanied by good sound affects giving quite an enjoyable game. With experience one can learn to anticipate the movement of the monsters and after several games you proceed to new rooms with different patterns to tackle and fresh monsters to avoid. All this is set against the clock. The less time you take, the higher your score. A very enjoyable game which appealed to all ages in our house.

The only drawback to this program is that exactly the same pattern of obstacles occur each time the program is run and the monsters seem to move in a preset pattern. With some experience therefore, you do learn how to get the better of each part of the game. Even so it will take a long time to run out of all the rooms and monsters available, as each pattern is significantly different from the others. Overall therefore this is a good game.

Iolo ap Gwynn



Sideways ROM board

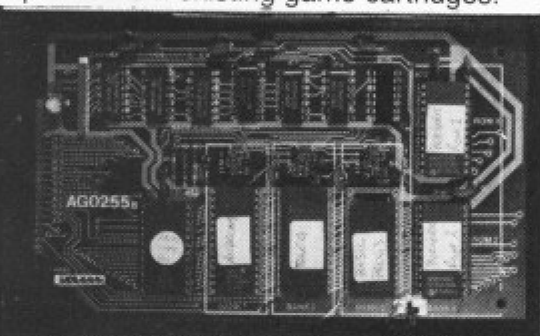
***Hywell Francis** examines some extra BASIC commands*

AFTER KEITH AND Steven Brain's review of a Dragon Eprom programmer many of you must be wondering what to do with your newly 'blown' Eproms. I hope to give you come ideas by examining an intelligent sideways Rom board.

Produced by Race Electronics the unit is housed in a well designed hard plastic case, which is supplied with support legs to prevent any strain on the Dragon's edge connector. As with all Dragon cartridges, it should never be inserted or removed while the Dragon is powered up. All the most popular Eprom devices may be used with this product, with sizes ranging from 2K up to 16K (Fig 1). However, this unit does not support the now obsolete tri-supply types of Eproms.

To facilitate the use of the Rom board, five additional commands have been added to the Dragon's BASIC (Fig 2). These extra commands are themselves held in Rom on the cartridge.

There are four banks of Eproms available for use at any time just by typing in Rom 1-4. The first three banks may be set up to take 28-pin devices while the fourth bank is set for two 2532 Eproms. This allows you to use any existing Dragon Data cartridge software. Bank four may be used for any 2532 software, not just Eproms from existing game cartridges.



Changing the first three banks to accept any of these devices (Fig 1) is relatively easy — each bank supports a 3 × 3 matrix of selection pins, which have been numbered vertically 1 to 3 and horizontally 'A' to 'B'. You would be advised to use a very small pair of tweezers to facilitate the removal and replacement of these selection links without damaging the unit. Only 14K of contiguous memory is permitted for each bank, so the top 2K of a 27128 device cannot be accessed.

The manual supplied with the unit gives all the technical information required to make the most of the sideways Rom board. It is written in very readable English and is only 10 pages long.

One very useful feature of this unit is its ability to recognise BASIC programs in Rom and load them into memory ready to Run. A special storage format has been used so that several BASIC programs may be held in a single Eprom.

When a BASIC program is loaded from Eprom the system is set to a merge mode. This allows the user to store a library of commonly used subroutines such as screen dumps or hi-res character set.

One minor restriction is that Usr calls (07), (08) and (09) are no longer available for use. However, the first six calls are still free.

The extended BASIC command Prepare takes the current BASIC program in memory and prepares it for tape storage. Once prepared, the program may then be committed to EPROM.

Few machine code programs on the market have been written in position independent code (relocatable at different memory addresses). So, in order that we can use software that does not reside in the cartridge memory &HC000 to &HFEFF, a 24 byte hard copy of a machine code program that should be appended to such non-relocatable programs is included. This is the method that may be used to 'Rom' such programs as Microdeal's *Telewriter*. The re-location program must have the new and old start address, old end address and the new EXEC address.

Reusing Dragon cartridges

Many people have been re-using Dragon Data's cartridges for their own firmware. However, this sideways Rom board, which costs £35, offers the first occasion to use such devices as 2764s and the 27128A.

The only criticism I have of the unit is that I would have liked the relocatable program included in the extended BASIC set of commands. However, there is a trade off between increasing the size of the operating software (2K at present) and the amount of cartridge memory available to the user.

If at present you do not have the facility to 'blow' your own Eproms then both the Eprom programmer and the Rom board must be considered together. Perhaps the companies involved might do a combined offer on the units.

In further tests, the two units both worked well with the Dragon 32 and 64. There was a cautionary note offered by the manufacturers that the Dragon 64's power supply might not handle these units, but in my tests they have worked very well indeed.

With the availability of various Eprom programmers for the Dragon this intelligent sideways Rom board is a very welcome addition to the arsenal of add on's for the Dragon 32 and 64 owner. ■

Memory Map

Area	Address
	FFFF
VECTORS,SAM	
	FF60
ROM SELECT LOGIC	
	FF40
I/O	
	FF00
SIDEWAYS ROM OPERATING SOFTWARE	
	F800
CURRENTLY ACTIVE SIDEWAYS ROM	
	C000
BASIC INTERPRETER	
	8000
STACK	
	7400
PREPARATION AREA FOR BASIC PROGRAMS	
	3C00
BASIC PROGRAM STORAGE	
	1E00
GRAPHICS PAGES 2 TO 4	
	0C00
GRAPHICS PAGE 1	
	0600
SCREEN	
	0400
BASIC SYSTEM USE	
	0100
SIDEWAYS ROM OPERATING SOFTWARE VARIABLES	
	00F0
PAGE 0	
	0000

MAXIMUM BASIC PROGRAM SPACE FOR 'PREPARE' (3C00 to 0C00)

Fig 1

DEVICES SUPPORTED BY THE ROM BOARD

EPROM	SIZE	TYPICAL MANUFACTURER
2716	2K X 8	INTEL
2516	2K X 8	TEXAS
2732	4K X 8	HITACHI
2732A	4K X 8	INTEL
2532	4K X 8	TEXAS
2764	8K X 8	INTEL
2764A	8K X 8	INTEL
27128	16K X 8	INTEL
27128A	16K X 8	INTEL

Fig 2

EXTENDED BASIC COMMANDS

Command	Description
ROM n	This command selects the requested ROM bank, where n= 1 to 4.
WHICH	By entering this command the selected ROM bank is displayed.
START	Start is like the EXEC command in BASIC it allows the operator to start at any address in the selected EPROM's.
SRLOAD	This allows the operator to merge a BASIC program from the sideways cartridge. Up 10 BASIC programs may be held in one ROM and accessed individually at any one time.
PREPARE	This command takes the BASIC program in memory and prepares it for storing to tape in 'romable' format ready to be blown to EPROM with a programmer.

Scramble

***Steve Gathercole** presents a graphic laser bike game*

THE GAME uses several machine code routines, so I have incorporated error checks at all the data statements. As a large amount of data is needed for the high detail I have also used error checks in the graphics data. This should help readers to type in the listing.

The object of the game is to break through the outer perimeter of a secret enemy base you have discovered on your laser bike. You must shoot down the missiles fired towards you. You only have a few shots at each missile and must guess the height and distance of your shot using the right joystick and the fire button to fire. Machine code has been used for the sound effects and scrolling.

Program Data

lines 60—90	read and poke machine code
lines 300—350	display wait screen
lines 550—1500	read and poke main graphics
lines 1510—1860	set up screen background
lines 1870—2100	main loop
lines 2570—2719	start again routine
lines 2730—3150	instructions
lines 3160—3340	draw string data and subroutine

Variable
A$ = draw string

Arrays
NL = number blank
BM = BOMB
BX = bomb explosion
BL = blank

Machine Code Routines
EXEC — 32187 (bomb scroll)
EXEC — 32215 (scroll screen clear)
EXEC — 32000 (main scroll for background)
EXEC — 32114 (laser sound)
EXEC — 32071 (bomb explosion sound)
EXEC — 32144 (motorbike explosion sound) ■

```
10 PCLEAR 8
20 CLEAR 250,32000:A=31999
30 GOTO 2730
40 C=0
50 GOTO 210
60 FOR N=1 TO 242
70 C=C+VAL("&H"+D$)
80 READ D$:POKE A+N,VAL("&H"+D$)
90 NEXT
100  IF C<>25827 THEN CLS:PRINT@20
0,"M/C DATA ERROR":STOP
105 REM***M/C DATA
110 DATA8E,08,60,E6,80,34,04,C6,1F
,A6,80,A7,1E,5A,26,F9,35,04,E7,1F,
8C,0D,E0,25,EA
120 DATA 8E,16,40,E6,80,34,04,C6,1
F,A6,80,A7,1E,5A,26,F9,35,04,E7,1F
,8C,1E,00,25,EA
130 DATA 86,3F,B7,FF,23,8E,00,01,C
6,80,F7,FF,20,5C,26,FA,30,1F,26,F4
,39
140 DATA B6,FF,23,8A,08,B7,FF,23,7
F,01,47,8E,B7,98,A6,80,8D,0D,A6,80
,8D,09,7A,01,47,26,F3,B6,FF,23,39,
B4,01,47,B7,FF,20,86,41,4A,26,FD,3
9
150 DATA 8E,00,78,86,3F,B7,FF,23,1
F,89,F7,FF,20,5C,26,FA,4C,30,1F,8C
,00,00,27,05,2A,01,4F,20,EB,39
160 DATA B6,FF,23,8A,08,B7,FF,23,7
F,01,47,8E,B7,98,A6,80,8D,0D,A6,80
,8D,09,7A,01,47,26,F3,B6,FF,23,39,
B4,01,47,B7,FF,20,86,FF,4A,26,FD,3
9
170 DATA 8E,0F,00,30,0C,E6,80,34,0
4,C6,13,A6,80,A7,1E,5A,26,F9,35,04
,E7,1F,8C,16,60,25,E8,39
180 DATA 8E,06,00,E6,80,34,04,C6,1
F,A6,80,A7,1E,5A,26,F9,35,04,5F,E7
,1F,8C,1E,00,25,E9,39
190 RETURN
200 REM**DISPLAY SCREEN
210 CLS:PRINT@41,"LASER BIKE"
220 PRINT@64,STRING$(32,"*")
230 PRINT@166,"BY STEVE GATHERCOLE
"
240 PRINT@235,"OCT-84":FOR T=1 TO
200:NEXT T
250 GOSUB 60
260 CLS0
270 FOR N=0 TO 63
280 SET(N,0,4)
290 SET(N,31,4)
300 NEXT
310 FOR N=1 TO 30
320 SET(0,N,4)
330 SET(63,N,4)
340 NEXT
350 FOR N=1 TO 108
360 READ X,Y:SET(X,Y,7):NEXT N
365 REM***DATA FOR WAIT SCREEN
370 DATA 11,9,11,10,11,11,11,12,11
,13,12,13,13,13,14,13,15,13
380 DATA 19,13,20,11,20,12,21,10,2
1,12,22,9,22,12,23,10,23,12,24,11,
24,12,25,13
390 DATA 33,9,32,9,31,9,30,9,29,10
,30,11,31,11,32,11,33,12,32,13,31,
13,30,13,29,13
400 DATA 41,9,40,9,39,9,38,9,37,9,
37,10,37,11,37,12,37,13,38,13,39,1
3,40,13,41,13,38,11,39,11,40,11
410 DATA 45,9,46,9,47,9,48,9,49,10
,48,11,47,11,46,11,45,11,45,10,45,
12,45,13,50,13,49,12
420 DATA 19,16,19,17,19,18,19,19,1
9,20,20,16,21,16,22,17,21,18,20,18
,22,19,21,20,20,20
430 DATA 26,16,26,17,26,18,26,19,2
6,20
440 DATA 30,16,30,17,30,18,30,19,3
0,20,31,18,33,16,32,17,32,19,33,20
450 DATA 37,16,38,16,39,16,40,16,4
1,16,37,17,37,18,38,18,39,18,40,18
,37,19,37,20,38,20,39,20,40,20,41,
20
460 FORN=0 TO 37
470 READ X,Y:SET(X,Y,2)
480 NEXT N
490 DATA 55,8,56,7,57,6,58,5,59,4,
60,3,61,2,62,1
500 DATA 1,1,2,2,3,3,4,4,5,5,6,6,7
,7,8,8
510 DATA 11,20,10,21,9,22,8,23,7,2
4,6,25,5,26,4,27,3,28,2,29,1,30
520 DATA 52,20,53,21,54,22,55,23,5
6,24,57,25,58,26,59,27,60,28,61,29
,62,30
530 PRINT@454,"WAIT A MINUTE PLEAS
E";
540 REM***SET UP GRAFICS
550 PMODE 4,1:PCLS
560 DIM BM(6),BX(6),BL(6),NL(7)
570 A=1535:C=0
580 FOR T=1 TO 8
590 FOR Y=1 TO 3
600 READ B:POKE A+Y,B:C=C+B:NEXT Y
610 A=A+32:NEXT T
620 IF C<>2154 THEN CLS:PRINT@200,
"GRAFICS DATA ERROR":STOP
630 DATA 0,0,96,0,1,224,0,3,224,1,
255,224,31,198,96,1,255,224,0,1,22
4,0,0,96
640 GET(0,0)-(24,8),BM,G
650 A=1535:C=0
660 FOR T=1 TO 8
670 FOR Y=1 TO 3
680 READ B:POKE A+Y,B:C=C+B:NEXT Y
690 A=A+32:NEXT T:IF C<>3073 THEN
CLS:PRINT @200,"GRAFICS DATA ERROR
":STOP
700 DATA 0,0,96,16,1,248,12,19,240
,7,255,227,31,215,238,1,255,248,11
2,111,255,15,223,248
710 GET(0,0)-(24,8),BX,G
720 PCLS:GET(0,0)-(24,8),BL,G
730 GET(0,0)-(30,8),NL,G
740 PMODE 4,1:PCLS
750 Z=3519:C=0
760 FOR A=1 TO 67
770 FOR N=1 TO 12
780 READ B:POKE Z+N,B
790 C=C+B
800 NEXT N
810 Z=Z+32
820 NEXT A:IF C<>45626 THEN CLS:PR
INT@200,"MOTOR BIKE DATA ERROR":ST
OP
830 REM**MOTORBIKE GRAFICS
840 DATA0,0,0,0,0,0,0,0,0,0,0,0
850 DATA0,0,0,0,0,0,0,0,0,0,0,0
860 DATA0,0,0,0,0,0,252,0,0,0,0,0
870 DATA0,0,0,0,0,3,2,0,0,0,0,0
880 DATA0,0,0,0,0,4,1,128,0,0,0,0
890 DATA0,0,0,0,0,4,0,128,0,0,0,0
900 DATA 0,0,0,0,0,8,15,64,0,0,0,0
910 DATA0,0,0,0,0,8,4,64,0,0,0,0
920 DATA0,0,0,0,0,8,4,32,0,0,0,0
930 DATA0,0,0,0,0,8,3,32,0,0,0,0
940 DATA0,0,0,0,0,4,0,240,0,0,0,0
950 DATA0,0,0,0,0,6,0,16,0,0,0,0
960 DATA0,0,0,0,0,5,200,16,0,0,0,0
970 DATA0,0,0,0,0,8,55,24,0,0,0,0
980 DATA0,0,0,0,0,49,16,0,0,0,0,0
990 DATA0,0,0,0,0,64,144,0,0,0,0,0
1000 DATA0,0,0,0,0,64,136,0,0,0,0,
0
1010 DATA0,0,0,0,0,128,136,1,248,0
,0,0
1020 DATA0,0,0,0,1,0,140,0,198,0,0
,0
1030 DATA0,0,0,0,1,0,67,0,33,0,0,0
1040 DATA0,0,0,0,2,8,48,192,16,192
,0,0
1050 DATA0,0,0,0,5,72,8,48,12,32,0
,0
1060 DATA0,0,0,0,4,68,6,12,130,17,
0,0
1070 DATA0,0,0,0,12,4,1,131,196,12
,0,0
1080 DATA0,0,0,0,11,3,0,107,104,2,
0,0
1090 DATA0,0,0,0,20,192,192,255,20
0,1,128,0
1100 DATA0,0,0,0,2,0,63,54,144,255
,192,0
1110 DATA0,0,0,0,112,64,103,243,15
,0,16,0
1120 DATA0,0,0,0,78,0,128,99,112,0
,8,0
1130 DATA0,0,0,0,129,129,0,63,128,
0,4,0
1140 DATA0,0,0,1,4,121,0,8,0,31,2,
0
1150 DATA0,0,0,1,136,14,0,112,0,56
```

```
,1,0
1160 DATA 0,0,0,2,80,4,15,128,15,2
40,0,128
1170 DATA0,0,0,2,0,8,240,0,0,0,0,2
48
1180 DATA191,255,255,196,0,8,128,0
,0,0,0,255
1190 DATA187,120,0,60,0,208,128,0,
0,0,3,0
1200 DATA157,188,0,6,0,48,128,31,2
40,128,124,0
1210 DATA158,222,0,1,78,12,128,63,
193,7,128,0
1220 DATA159,111,128,1,1,3,128,127
,7,120,0,0
1230 DATA15,183,255,197,224,65,129
,126,3,128,0,0
1240 DATA15,255,255,224,30,0,66,25
2,15,0,0,0
1250 DATA4,255,1,248,1,160,64,188,
13,128,0,0
1260 DATA9,131,255,252,0,64,193,12
0,21,159,128,0
1270 DATA18,3,223,254,0,129,164,24
0,34,255,255,193
1280 DATA36,8,33,191,0,131,33,224,
67,255,254,0
1290 DATA56,19,254,95,255,130,35,1
92,67,127,254,0
1300 DATA32,45,253,143,255,4,71,2,
135,255,205,0
1310 DATA 0,78,67,131,254,4,71,243
,15,252,50,128
1320 DATA0,156,64,201,254,8,129,66
,15,248,13,128
1330 DATA1,114,96,116,124,23,3,130
,31,248,5,64
1340 DATA2,161,255,170,7,242,11,4,
62,62,2,96
1350 DATA2,195,255,250,3,140,14,8,
244,31,255,96
1360 DATA2,195,255,254,0,48,28,49,
252,30,255,96
1370 DATA2,199,255,255,192,192,176
,33,152,131,127,96
1380 DATA5,192,255,255,255,1,224,3
2,108,63,225,176
1390 DATA2,193,215,255,240,128,0,6
4,52,55,65,96
1400 DATA2,199,234,31,240,64,0,64,
52,94,193,96
1410 DATA2,223,142,26,127,224,1,12
8,52,239,129,96
1420 DATA2,190,7,42,0,24,6,0,51,21
0,2,96
1430 DATA1,120,5,180,0,7,248,0,26,
224,2,192
1440 DATA1,112,2,244,0,0,0,0,21,19
2,5,64
1450 DATA0,152,2,200,0,0,0,0,13,12
8,13,128
1460 DATA 0,110,3,176,0,0,0,0,10,9
6,50,128
1470 DATA0,77,253,160,0,0,0,0,5,15
9,205,0
1480 DATA0,19,254,64,0,0,0,0,3,66,
22,0
1470 DATA0,0,33,120,0,0,0,0,0,189,
248,0
1500 DATA0,3,222,0,0,0,0,0,0,127,2
24,0
1510 REM***SCREEN BACKGROUND
1520 LINE(0,132)-(254,134),PSET,BF
1530 FOR A=10 TO 235 STEP 25
1540 LINE(A,132)-(A+8,132),PRESET
1550 LINE(A-1,133)-(A+7,133),PRESE
T
1560 LINE(A-2,134)-(A+6,134),PRESE
T
1570 NEXT A
1580 LINE(0,170)-(254,173),PSET,BF
1590 FOR A=30 TO 230 STEP 50
1600 LINE(A,165)-(A+3,190),PSET,BF
1610 NEXT A
1620 FOR A=0 TO 250 STEP 14
1630 B=10+RND(5)
1640 CIRCLE(A,185),B
1650 NEXT A
1660 LINE(0,70)-(43,70),PSET
1670 LINE(60,70)-(254,70),PSET
1680 FOR A=30 TO 230 STEP 50
1690 LINE(A,30)-(A+3,60),PSET,BF
1700 NEXT A
1710 LINE(0,34)-(254,37),PSET,BF
1720 LINE(0,50)-(254,53),PSET,BF
1730 FOR A=0 TO 250 STEP 14
1740 B=10+RND(5)
1750 CIRCLE(A,45),B
1760 NEXT A
1770 GOSUB 3160
1780 XX=2:YY=2:A$="SCORE":DRAW"S6C
5":GOSUB3270
1790 XX=180:YY=2:A$="HIGH":GOSUB 3
270
1800 XX=100:YY=2:A$="FUEL":GOSUB 3
270
1810 LINE(0,10)-(254,10),PSET
1820 HI=0:SC=0:F=30
1830 A$=STR$(HI):XX=204:YY=2:GOSUB
 3270
1840 A$=STR$(SC):XX=39:YY=2:GOSUB
3270
1850 A$=STR$(F):XX=133:YY=2:GOSUB
3270
1860 PCOPY 1 TO 5:PCOPY 2 TO 6:PCO
PY 3 TO 7:PCOPY 4 TO 8:SCREEN 1,1
1870 REM *****MAIN LOOP
1880 D=1:S=0
1890 FOR P=1 TO 3
1900 A$="INTRUDER":XX=180:YY=90:DR
AW"S8C5":GOSUB 3270:PLAY"V31;L255;
T200;AAAAAAA;T50;AAAA;T25;AAA;T5;A
A":A$="INTRUDER":XX=180:YY=90:DRAW
"S8C0":GOSUB 3270:NEXT P
1910 EXEC 32000
1920 IF D=1 THEN GOSUB 2190
1930 J0=JOYSTK(0):J1=JOYSTK(1)
1940 U=J1+72:A=65+(J0*3)
1950 IF U>=130 THEN U=130
1960 IF U<=72 THEN U=72
1970 EXEC 32000
1980 IF A<=96 THEN A=96
1990 IF(PEEK(65280)AND 1)=0  AND S
2000 EXEC 32000
2010 EXEC 32187:B=B-8
2020 IF SC>3000 THEN GOSUB 2470
2030 IF B=70 THEN B=230
2040 EXEC 32000
2050 IF B=94 THEN GOSUB 2320
2060 IF F=0 THEN GOTO 2570
2070 EXEC 32000
2080 IF SC>6000 THEN GOSUB 2520
2090 GOTO 1910
2100 REM**END OF MAIN LOOP
2110 REM***FIRE
2120 DRAW"C5"
2130 LINE(96,95)-(A,U),PSET
2140 EXEC 32114
2150 LINE(96,95)-(A,U),PRESET
2160 IF A>=B+3 AND A<=B+20 AND U>=
E+2 AND U<=E+6 THEN GOSUB 2240
2170 S=S+1
2180 RETURN
2190 REM ****PUT BOMB
2200 X=230:Y=RND(49)+72
2210 PUT(X,Y)-(X+24,Y+8),BM,PSET
2220 B=X:D=0:E=Y
2230 RETURN
2240 REM***HIT BOMB
2250 EXEC 32071
2260 PUT(B,E)-(B+24,E+8),BX,PSET:P
UT(B,E)-(B+24,E+8),BL,PSET
2270 D=1:S=0
2280 SC=SC+300+B
2290 PUT(41,1)-(71,9),NL,PSET
2300 A$=STR$(SC):XX=39:YY=2:DRAW"S
6C5":GOSUB 3270
2310 RETURN
2320 REM ***HIT BIKE
2330 PUT(96,E)-(120,E+8),BX,PSET
2340 PUT(231,E)-(255,E+8),BL,PSET
2350 FOR S=1 TO 3
2360 SCREEN 1,0
2370 EXEC 32144
2380 NEXT S
2390 SCREEN 1,1
2400 S=0:F=F-10+RND(6)
2410 IF F<=0 THEN F=0
2420 PUT(96,E)-(120,E+8),BL,PSET
2430 D=1
2440 PUT(133,1)-(163,9),NL,PSET
2450 A$=STR$(F):XX=133:YY=2:DRAW"S
6C5":GOSUB 3270
2460 RETURN
2470 REM **:SPEED UP BOMB
2480 EXEC 32187
2490 B=B-8
2500 IF B=102 THEN GOSUB 2320
2510 RETURN
2520 REM***EVEN FASTER
2530 EXEC 32187
2540 B=B-8
2550 IF B=94 THEN GOSUB 2320
2560 RETURN
2570 REM**GO AGAIN
2580 A$="PRESS  S  TO RESTART" :XX
=90:YY=140:DRAW"S6C5":GOSUB 3270
2590 A$="PRESS  F  TO STOP":XX=90:
YY=155:GOSUB 3270
2600 A$=INKEY$
2610 IF A$="S" THEN 2640
2620 IF A$="F" THEN CLS:STOP
2630 GOTO 2600
2640 FOR Q=1 TO 32
2650 EXEC 32215
2660 NEXT Q
2670 PCOPY 5 TO 1:PCOPY 6 TO 2:PCO
PY 7 TO 3:PCOPY 8 TO 4
2680 IF SC>HI THEN HI=SC
2690 D=1:S=0:F=30:SC=0
2700 PUT(204,1)-(234,9),NL,PSET
2710 A$=STR$(HI):XX=205:YY=2:GOSUB
 3270
2720 GOTO 1890
2730 REM**:INSTRUCTIONS
2740 CLS
2750 PRINTSTRING$(32,"*")
2760 PRINT@42,"LASER BIKE"
2770 PRINTSTRING$(32,"*")
2780 PRINT"YOU HAVE JUST BROKEN TH
ROUGH"
2790 PRINT"THE MAIN DEFENCES OF A
SECRET"
2800 PRINT"ENEMY BASE..."
2810 PRINT:PRINT"AS YOU RIDE DOWN
THE ROAD"
2820 PRINT"LINED WITH BARBED WIRE
YOU ARE"
2830 PRINT"DISCOVERD ON RADAR THE
OUTER"
2840 PRINT"DEFENCES ARE ALERTED AN
D"
2850 PRINT"MISSILES ARE SENT DOWN
THE ROAD"
2860 PRINT"TOWARDS YOU...."
2870 PRINT@456,"press any key"
2880 A$=INKEY$:IF A$="" THEN 2880
2890 CLS
2900 PRINT"YOUR ONLY DEFENCE IS YO
UR"
2910 PRINT"POWERFULL LASER BIKE HO
WEVER"
2920 PRINT"YOUR BIKE HAS BEEN DAMA
GED"
2930 PRINT"AND YOU ONLY HAVE A FEW
 SHOTS""
2940 PRINT"AT EACH MISSILE..."
2950 PRINT"THE MISSILES WILL EXPLO
DE"
2960 PRINT"JUST IN FRONT OF YOU AB
SORBING"
2970 PRINT"YOUR FUEL...."
2980 PRINT"USE THE RIGHT JOYSTICK
TO"
2990 PRINT"AIM THE LASER SHOTS"
3000 PRINT"YOU WILL HAVE TO GUESS"
3010 PRINT"THE HIGHT AND DISTANCE
AS"
3020 PRINT"YOUR MISSILE SIGHT WAS
DESTROYED"
3030 PRINT@456,"press any key"
3040 A$=INKEY$:IF A$="" THEN 3040
3050 CLS:PRINT:PRINT"YOU MUST HIT
THE MISSILE"
3060 PRINT"TO DESTROY IT IF YOU FI
RE"
3070 PRINT"THROUGH THE MISSILE YOU
 WILL"
3080 PRINT"JUST BLAST BITS AWAY LE
AVING"
3090 PRINT"LESS TO FIRE AT!!"
3100 PRINT:PRINT"THE FURTHER AWAY
THE BOMB"
3110 PRINT"WHEN YOU HIT IT THE HIG
HER "
3120 PRINT"YOU WILL SCORE"
3130 PRINT@456,"press any key"
3140 A$=INKEY$:IF A$="" THEN 3140
3150 GOTO 40
3160 REM**** DRAW STRING ROUTINE
3170 DIM LE$(26)
3180 FOR K=0 TO 26:READ LE$(K):NEX
T
3190 FOR K=0 TO 9:READ NU$(K):NEXT
3200 DATA BR2,ND4R3D2NL3ND2BE2,ND4
R3DGNL2FDNL3BU4BR2,NR3D4R3BU4BR2,N
D4R2FD2GL2BE4BR,NR3D2NR2D2R3BU4BR2
3210 DATA NR3D2NR2D2BE4BR,NR3D4R3U
2LBE2BR,D4BR3U2NL3U2BR2,ND4BR2,BD4
REU3L2R3BR2,D2ND2NF2E2BR2
3220 DATA D4R3BU4BR2,ND4FREND4BR2,
ND4F3DU4BR2,NR3D4R3U4BR2,ND4R3D2NL
3BE2,NR3D4R3NHU4BR2
3230 DATA ND4R3D2L2F2BU4BR2,BD4R3U
2L3U2R3BR2,RND4RBR2,D4R2U4BR2,D3FE
U3BR2,D4EFU4BR2
3240 DATA DF2DBL2UE2UBR2,DFND2EUBR
2,R3G3DR3BU4BR2
3250 DATA NR2D4R2U4BR2,BDEND4BR2,R
2D2L2D2R2BU4BR2,NR2BD2NR2BD2R2U4BR
2,D2R2D2U4BR2,NR2D2R2D2L2BE4,D4R2U
2L2BE2BR2,R2ND4BR2,NR2D4R2U2NL2U2B
R2,NR2D2R2D2U4BR2
3260 RETURN
3270 DRAW"BM"+STR$(XX)+","+STR$(YY
)
3280 FOR K=1 TO LEN(A$)
3290 B$=MID$(A$,K,1)
3300 IF B$>="0" AND B$<="9" THEN D
RAW NU$(VAL(B$)):GOTO 3330
3310 IF B$=" " THEN N=0 ELSE N=ASC
(B$)-64
3320 DRAW LE$(N)
3330 NEXT
3340 RETURN
```

Dumping on the Epson

Alan Wrigley shows you how to print out high-resolution graphics on an Epson

THIS IS A program for the Dragon 32 which enables pictures drawn on the high-resolution screen to be printed on an Epson printer, in either single- or double-density mode. The whole screen can be dumped to the printer with a single key-press, or alternatively a rectangle of any shape and size can be defined on the screen and then printed. This latter feature enables you to design logos or alternative type-faces for letter-headings, for example.

Programs written in Basic can take several minutes to dump an entire screen, so this one is written entirely in machine-code. It occupies 421 bytes of RAM between locations 32347 (7E5B hex) and 32767 (7FFF hex). In single-density mode, an entire high-resolution (that is PMODE4) screen is printed in 32 seconds, or 45 seconds in double-density mode.

The program can be entered using the hex loader program in figure 1. When finished, it can be saved as a machine-code program in the normal way, that is: CSAVEM "PROGNAME", 32347, 32767, 32347.

When ... space fo... corrupt th...

The sir... within th... your pict... then be ... from com... PMODE4... ways us... tures; if y... the progr...

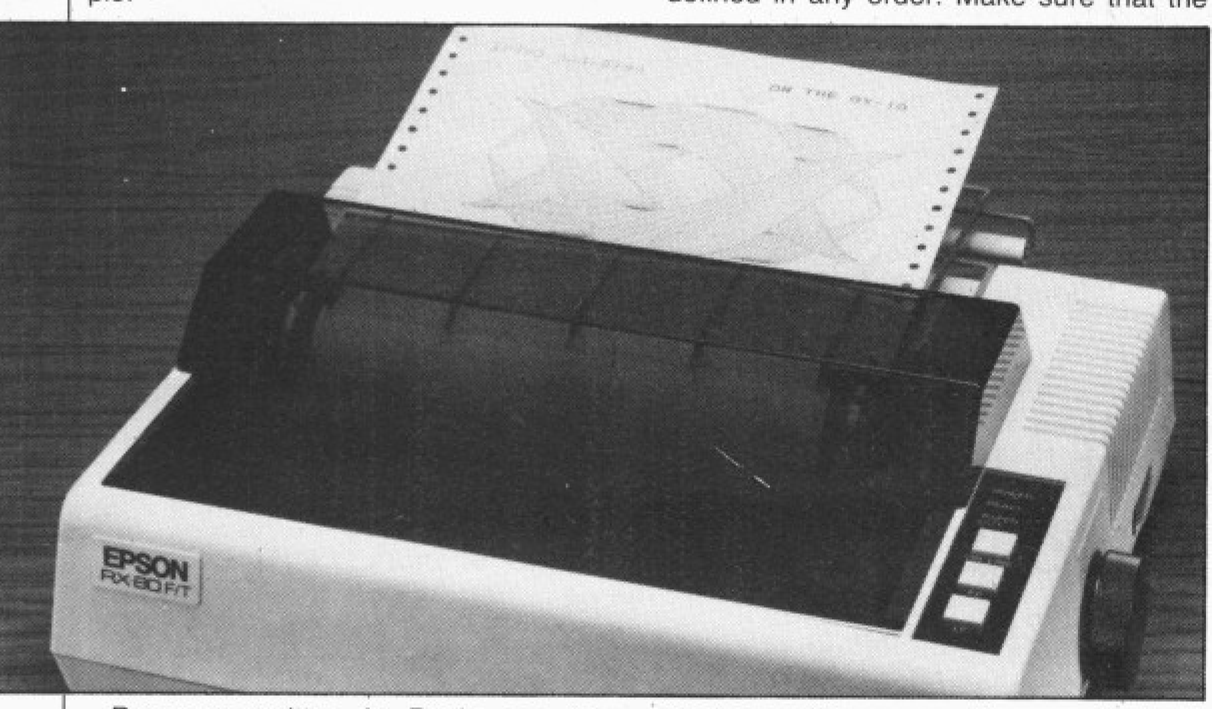
As soo...

see a cursor in the top left-hand corner of the screen. If you wish to dump the whole screen simply press W, and skip the rest of this paragraph. If you want to select part of the screen you should move the cursor around with the arrow keys. You must define your rectangle at the top left, top right and bottom left corners. To do this, place the cursor over the top left and press L; over the top right and press R; and over the bottom left and press B. These can be defined in any order. Make sure that the two top positions are on the same horizontal row of the screen, as otherwise you will probably print garbage. Moving the cursor up or down one row at a time takes an age, so to speed it up you can press the Shift key together with the up or down arrow key.

When you are satisfied that all three positions have been correctly defined, press the Clear key. The screen will now ask you to choose between single- or double-density (press 1 or 2). As soon as you have done so the information will be fed to the printer. The remainder of the program translates the data in the screen memory, which is arranged horizontally, into the data required by the printer, which must be arranged vertically, eight rows at a time.

Locations 7FED to 7FF6 hex contain the control codes which are sent to the printer. The printer is first initialised with ESC "@", which cancels any previous control codes. If, therefore, you want to send any printer codes before the routine, for example to set margins, then you must bypass this instruction by Poking 239 into location 32562 (which normally contains 237) before calling the routine. The next three bytes send ESC "A",8 to the printer to set ⅛th inch line spacing, which ensures that each line is printed immediately below the previous one.

At the start of each line the printer is fed with ESC "*", which sets the bit-image mode, and three further bytes to specify the density and the number of bits in the line. The contents of these three bytes are regulated automatically by the program. ■




```
10 CLEAR200,32346
20 FORI=32347TO32755
30 PRINTHEX$(I);:INPUTY$
40 POKEI,VAL("&H"+Y$)
50 NEXT
```

Figure 1

Hex dump for screen dump program

```
7E5B                                                 8E 06 00 63 84
7E60    BD 80 06 27 FB 63 84 81 5B 27 04 81 5F 26 03 BD
7E70    7F A6 81 5E 26 0A 8C 06 20 25 03 30 88 E0 20 DE
7E80    81 0A 26 0A 8C 1D DF 22 03 30 88 20 20 D0 81 09
7E90    26 09 8C 1D FE 22 02 30 01 20 C3 81 08 26 09 8C
7EA0    06 01 25 02 30 1F 20 B6 81 4C 26 05 BF 7F FE 20
                                                A1 81 42 26
                                                26 92 8E 06
                                                00 BF 7F FA
                                                B7 FF C2 B7
                                                8C 06 00 26
                                                80 0C 8C 7F
                                                26 F5 80 31
                                                89 FD 7F F5
                                                F6 C6 05 8E
                                                FE 86 80 B7
                                                7F F7 4F E6
```

```
( 32422 )  BRA - 74      20B6
( 32424 )  CMPA # 76     814C
( 32426 )  BNE + 5       2605
( 32428 )  STX  32766    BF7FFE
( 32431 )  BRA - 83      20AD
( 32433 )  CMPA # 82     8152
( 32435 )  BNE + 8       2608
( 32437 )  LEAY  1 ,X    3101
( 32439 )  STY  32764    10BF7FFC
( 32443 )  BRA - 95      20A1
( 32445 )  CMPA # 66     8142
```

```
↑ 32350    7F2D ( 32557 )  STD  32757      FD
           7F30 ( 32560 )  LDX # 32749     8E
↓ 32433    7F33 ( 32563 )  LDA ,X+         A6
           7F35 ( 32565 )  JSR  32783      BD
↑ 32350    7F38 ( 32568 )  CMPX # 32754    8C
           7F3B ( 32571 )  BNE - 10        26
↓ 32445    7F3D ( 32573 )  LDB # 5         C6
           7F3F ( 32575 )  LDX # 32754     8E
           7F42 ( 32578 )  LDA ,X+         A6
↑ 32350    7F44 ( 32580 )  JSR  32783      BD
           7F47 ( 32583 )  DEC B           5A
```

```
7F60   A4 48 F4 7F F9 26 01 4C 31 A8 20 7A 7F F7 26 EF
7F70   F6 7F EC BD 80 0F 5A 26 FA 74 7F F9 7A 7F F8 26
7F80   D6 30 01 BC 7F FC 26 C5 86 0D BD 80 0F 30 89 01
7F90   00 BF 7F FC BE 7F FE BC 7F FA 24 09 30 89 01 00
7FA0   BF 7F FE 20 98 39 63 84 BD 80 06 10 8E 01 50 C6
7FB0   FF E7 A0 10 8C 01 59 26 F8 4D 27 EC 63 84 81 5B
7FC0   26 0A 8C 1D DF 22 03 30 88 20 20 DA 81 5F 27 01
7FD0   39 8C 06 20 25 03 30 88 E0 20 CB 44 45 4E 53 49
7FE0   54 59 20 28 31 20 4F 52 20 32 29 3F 02 1B 40 1B
7FF0   41 08 1B 2A
```

Disassembled listing

```
7E5B ( 32347 )  LDX # 1536     8E0600
7E5E ( 32350 )  COM ,X         6384
7E60 ( 32352 )  JSR  32774     BD8006
7E63 ( 32355 )  BEQ - 5        27FB       ↑ 32352
7E65 ( 32357 )  COM ,X         6384
7E67 ( 32359 )  CMPA # 91      815B
7E69 ( 32361 )  BEQ + 4        2704       ↓ 32367
7E6B ( 32363 )  CMPA # 95      815F
7E6D ( 32365 )  BNE + 3        2603       ↓ 32370
7E6F ( 32367 )  JSR  32678     BD7FA6
7E72 ( 32370 )  CMPA # 94      815E
7E74 ( 32372 )  BNE + 10       260A       ↓ 32384
7E76 ( 32374 )  CMPX # 1568    8C0620
7E79 ( 32377 )  BLO + 3        2503       ↓ 32382
7E7B ( 32379 )  LEAX -32 ,X    3088E0
7E7E ( 32382 )  BRA - 34       20DE       ↑ 32350
7E80 ( 32384 )  CMPA # 10      810A
7E82 ( 32386 )  BNE + 10       260A       ↓ 32398
7E84 ( 32388 )  CMPX # 7647    8C1DDF
7E87 ( 32391 )  BHI + 3        2203       ↓ 32396
7E89 ( 32393 )  LEAX  32 ,X    308820
7E8C ( 32396 )  BRA - 48       20D0       ↑ 32350
7E8E ( 32398 )  CMPA # 9       8109
7E90 ( 32400 )  BNE + 9        2609       ↓ 32411
7E92 ( 32402 )  CMPX # 7678    8C1DFE
7E95 ( 32405 )  BHI + 2        2202       ↓ 32409
7E97 ( 32407 )  LEAX  1 ,X     3001
7E99 ( 32409 )  BRA - 61       20C3       ↑ 32350
7E9B ( 32411 )  CMPA # 8       8108
7E9D ( 32413 )  BNE + 9        2609       ↓ 32424
7E9F ( 32415 )  CMPX # 1537    8C0601
7EA2 ( 32418 )  BLO + 2        2502       ↓ 32422
7EA4 ( 32420 )  LEAX -1 ,X     301F
7EA6 ( 32422 )  BRA - 74       20B6       ↑ 32350
7EA8 ( 32424 )  CMPA # 76      814C
7EAA ( 32426 )  BNE + 5        2605       ↓ 32433
7EAC ( 32428 )  STX  32766     BF7FFE
7EAF ( 32431 )  BRA - 83       20AD       ↑ 32350
7EB1 ( 32433 )  CMPA # 82      8152
7EB3 ( 32435 )  BNE + 8        2608       ↓ 32445
7EB5 ( 32437 )  LEAY  1 ,X     3101
7EB7 ( 32439 )  STY  32764     10BF7FFC
7EBB ( 32443 )  BRA - 95       20A1       ↑ 32350
7EBD ( 32445 )  CMPA # 66      8142
7EBF ( 32447 )  BNE + 5        2605       ↓ 32454
7EC1 ( 32449 )  STX  32762     BF7FFA
7EC4 ( 32452 )  BRA - 104      2098       ↑ 32350
7EC6 ( 32454 )  CMPA # 12      810C
7EC8 ( 32456 )  BEQ + 22       2716       ↓ 32480
7ECA ( 32458 )  CMPA # 87      8157
7ECC ( 32460 )  BNE - 110      2692       ↑ 32352
7ECE ( 32462 )  LDX # 1536     8E0600
7ED1 ( 32465 )  STX  32766     BF7FFE
7ED4 ( 32468 )  LDX # 1568     8E0620
7ED7 ( 32471 )  STX  32764     BF7FFC
7EDA ( 32474 )  LDX # 7424     8E1D00
7EDD ( 32477 )  STX  32762     BF7FFA
7EE0 ( 32480 )  LDD  32764     FC7FFC
7EE3 ( 32483 )  SUBD  32766    B37FFE
7EE6 ( 32486 )  CLR  65314     7FFF22
7EE9 ( 32489 )  STA  65472     B7FFC0
7EEC ( 32492 )  STA  65474     B7FFC2
7EEF ( 32495 )  STA  65476     B7FFC4
7EF2 ( 32498 )  STA  65478     B7FFC6
7EF5 ( 32501 )  LDX # 1024     8E0400
7EF8 ( 32504 )  LDA # 96       8660
7EFA ( 32506 )  STA ,X+        A780
7EFC ( 32508 )  CMPX # 1536    BC060[illegible]
7EFF ( 32511 )  BNE - 7        26F[illegible]
7F01 ( 32513 )  LDX # 1160     8E0488
7F04 ( 32516 )  STX  136       9F88
7F06 ( 32518 )  LDX # 32731    8E7FDB
7F09 ( 32521 )  LDA ,X+        A680
7F0B ( 32523 )  JSR  32780     BD800C
7F0E ( 32526 )  CMPX # 32748   8C7FEC
7F11 ( 32529 )  BNE - 10       26F6       ↑ 32521
7F13 ( 32531 )  JSR  32774     BD8006
7F16 ( 32534 )  CMPA # 49      8131
7F18 ( 32536 )  BEQ + 4        2704       ↓ 32542
7F1A ( 32538 )  CMPA # 50      8132
7F1C ( 32540 )  BNE - 11       26F5       ↑ 32531
7F1E ( 32542 )  SUBA # 49      8031
7F20 ( 32544 )  STA  32756     B77FF4
7F23 ( 32547 )  INC A          4C
7F24 ( 32548 )  STA  32748     B77FEC
7F27 ( 32551 )  ASL A          48
7F28 ( 32552 )  ASL A          48
7F29 ( 32553 )  ASL A          48
7F2A ( 32554 )  MUL            3D
7F2B ( 32555 )  EXG A,B        1E89
7F2D ( 32557 )  STD  32757     FD7FF5
7F30 ( 32560 )  LDX # 32749    8E7FED
7F33 ( 32563 )  LDA ,X+        A680
7F35 ( 32565 )  JSR  32783     BD800F
7F38 ( 32568 )  CMPX # 32754   8C7FF2
7F3B ( 32571 )  BNE - 10       26F6       ↑ 32563
7F3D ( 32573 )  LDB # 5        C605
7F3F ( 32575 )  LDX # 32754    8E7FF2
7F42 ( 32578 )  LDA ,X+        A680
7F44 ( 32580 )  JSR  32783     BD800F
7F47 ( 32583 )  DEC B          5A
```


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```
7F48 ( 32584 )  BNE - 8        26F8        ↑ 32578
7F4A ( 32586 )  LDX  32766     BE7FFE
7F4D ( 32589 )  LDA # 128      8680
7F4F ( 32591 )  STA  32761     B77FF9
7F52 ( 32594 )  LDA # 8        8608
7F54 ( 32596 )  STA  32760     B77FF8
7F57 ( 32599 )  TFR X,Y        1F12
7F59 ( 32601 )  LDA # 8        8608
7F5B ( 32603 )  STA  32759     B77FF7
7F5E ( 32606 )  CLR A          4F
7F5F ( 32607 )  LDB ,Y         E6A4
7F61 ( 32609 )  ASL A          48
7F62 ( 32610 )  ANDB  32761    F47FF9
7F65 ( 32613 )  BNE + 1        2601        ↓ 32616
7F67 ( 32615 )  INC A          4C
7F68 ( 32616 )  LEAY  32 ,Y    31A820
7F6B ( 32619 )  DEC  32759     7A7FF7
7F6E ( 32622 )  BNE - 17       26EF        ↑ 32607
7F70 ( 32624 )  LDB  32748     F67FEC
7F73 ( 32627 )  JSR  32783     BD800F
7F76 ( 32630 )  DEC B          5A
7F77 ( 32631 )  BNE - 6        26FA        ↑ 32627
7F79 ( 32633 )  LSR  32761     747FF9
7F7C ( 32636 )  DEC  32760     7A7FF8
7F7F ( 32639 )  BNE - 42       26D6        ↑ 32599
7F81 ( 32641 )  LEAX  1 ,X     3001
7F83 ( 32643 )  CMPX  32764    BC7FFC
7F86 ( 32646 )  BNE - 59       26C5        ↑ 32589
7F88 ( 32648 )  LDA # 13       860D
7F8A ( 32650 )  JSR  32783     BD800F
7F8D ( 32653 )  LEAX  256 ,X   30890100
7F91 ( 32657 )  STX  32764     BF7FFC
7F94 ( 32660 )  LDX  32766     BE7FFE
7F97 ( 32663 )  CMPX  32762    BC7FFA
7F9A ( 32666 )  BHS + 9        2409        ↓ 32677
7F9C ( 32668 )  LEAX  256 ,X   30890100
7FA0 ( 32672 )  STX  32766     BF7FFE
7FA3 ( 32675 )  BRA - 104      2098        ↑ 32573
7FA5 ( 32677 )  RTS            39
7FA6 ( 32678 )  COM ,X         6384
7FA8 ( 32680 )  JSR  32774     BD8006
7FAB ( 32683 )  LDY # 336      108E0150
7FAF ( 32687 )  LDB # 255      C6FF
7FB1 ( 32689 )  STB ,Y+        E7A0
7FB3 ( 32691 )  CMPY # 345     108C0159
7FB7 ( 32695 )  BNE - 8        26F8        ↑ 32689
7FB9 ( 32697 )  TST A          4D
7FBA ( 32698 )  BEQ - 20       27EC        ↑ 32680
7FBC ( 32700 )  COM ,X         6384
7FBE ( 32702 )  CMPA # 91      815B
7FC0 ( 32704 )  BNE + 10       260A        ↓ 32716
7FC2 ( 32706 )  CMPX # 7647    8C1DDF
7FC5 ( 32709 )  BHI + 3        2203        ↓ 32714
7FC7 ( 32711 )  LEAX  32 ,X    308820
7FCA ( 32714 )  BRA - 38       20DA        ↑ 32678
7FCC ( 32716 )  CMPA # 95      815F
7FCE ( 32718 )  BEQ + 1        2701        ↓ 32721
7FD0 ( 32720 )  RTS            39
7FD1 ( 32721 )  CMPX # 1568    8C0620
7FD4 ( 32724 )  BLO + 3        2503        ↓ 32729
7FD6 ( 32726 )  LEAX -32 ,X    3088E0
7FD9 ( 32729 )  BRA - 53       20CB        ↑ 32678
```

Go Flex

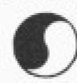
***Brian Cadge** looks at an alternative to OS9*

IF YOU ARE thinking of moving up to a professional operating system for your Dragon, then an alternative to OS-9 is Flex from Compusense. The minimum system required is a 64K Dragon and a disk drive, though two disk drives are preferable.

The Flex disk is supplied with a hefty 200 page manual which describes all the commands and the editor/assembler which is included on the system disk. Also included is a booklet describing a few extra features added to the standard Flex set up for the Dragon implementation. Unfortunately, I have not seen a copy of the latter.

It is advisable not to use your original disk, but to immediately make a back-up copy and use this to boot Flex (one crash could wipe out the disk). Once inserted into the disc drive, Flex is started using the BOOT command. After a few seconds the screen goes into 51 column mode, (using Pmode 4 graphics) and asks for the current date to be typed in.

The disk supplied has a demo program installed as the startup procedure which 'welcomes' you to Flex (this can be deleted from the disk once your're familiar with the package). Three 'q's is Flex's prompt to signal that it is waiting for a command. The first one to try is CAT which shows a directory of the disk — various parameters can be added to the command so that only certain types of file are listed etc. The size of the file is also shown.



As with OS9, the BUILD command allows you to enter a file from the keyboard. The EXEC command can be used to execute this file as a set of instructions. You might, for example, build a file with the necessary commands to copy the disk on a fresh disk in drive 2.

A powerful TTYSET command allows you to alter just about every attribute associated with your terminal, as this is never anything but a Dragon running Compusense's standard 512 column display, this will seldom be used.

A certain degree of I/O redirection is possible. Sending output to a file or printer, rather than the screen, and taking input from a file, rather than the keyboard, are all supported.

The Flex Operating System is comprised of three parts, the File Management System, which allocates disk space, the Disk Operating System, which interfaces the programs and the FMS to the Dragon disk drives, and the utility command Set, which are the commands such as CAT, DELete, BUILD, etc. All of these are stored on the disk and are only loaded when called by the user. Flex itself is stored in Ram starting at $C000, which just happens to be where the Dragondos is stored on Rom.

Also included on the Flex disk, as mentioned earlier, is an Assembler/Editor. the editor is used to prepare text files for the assembler. It is a fair text editor, but is in no way a word processor. The assembler is the program worth looking at.

A file is assembled by calling the assembler, called ASMB and following this by the filename of the source code. A number of options can be added to do things like: generate no object code, suppress the assembled listing, suppress the symbol table output and suppress warning messages.

The assembler uses the standard Motorola mnemonics, so most assembly language programs for the Dragon can be entered with the minimum of changes. However, there are some very powerful features that most Dragon assemblers do not offer. Disk files can be assembled into part of the program, using the LIB directive, several conditional assembly constructions using IF are supported, such as:

```
IF <expression>

        conditional code goes here
ENDIF
```

Finally, perhaps the most powerful option is to include macros into your program. Macros are similar to subroutines, except that when called the code is inserted at the current location. Therefore, three calls to a macro results in three copies of the same code in your program — not very efficient. Macros really become useful when you start using them with parameters — the basic construction of the code is the same each time, but the memory addresses used are different and are supplied as parameters in the macro call. Using conditional assembly statements in the macro itself allows very powerful programming techniques to be used.

If you want to know more about the Flex operating system then there is an advanced programmers guide available. This is certainly not written for the beginner and none of the information included in it is needed to use Flex efficiently. But if you fancy writing your own Flex commands, or customising your system, then you will find all the information here.



A memory map of all the user callab.. routines is included, as well as a list of the useful locations used by Flex. There are sections on the DOS, the file management system, the disk drivers, printer driver and writing your own utility programs. Assembly language examples are liberally scattered throughout the text. Again the manual refers only to Flex, and doesn't mention the Dragon or any particular implementation.

Just released is DBASIC, which allows you to use the standard Microsoft Basic in Rom with Flex. When loaded, DBASIC copies the Rom into Ram and cold starts the Basic. There are additions such as CSAVEF to save a file on to a Flex disk, and CLOADF to load it back. Using the EXEC command with a string, instead of an address, allows you to Pass a command directly to Flex, such as EXEC "CAT", which will directory the disk.

The cassette filing commands, OPEN, CLOSE, INPUT, PRINT etc have been extended to handle up to eight files at once — either serial data, random access or text files can be specified. Channel numbers 1-8 are used.



There are also extensions to the CLS command to use the hi-res 51 column text screen, so you effectively get Compusense's 'Hi-Res' cartridge built in. Existing programs can be loaded and will run, with the exception of those that use Dragondos commands. This package is only really intended as a cheap alternative to a complicated Basic running under Flex, and to maintain compatibility with present Dragon programs.

Finally, also available for Dragon Flex is the RMS database, which is also available for the OS9 operating system. The record management system allows you to store just about any type of record you want, such as personnel, customer, accounting, or club files.

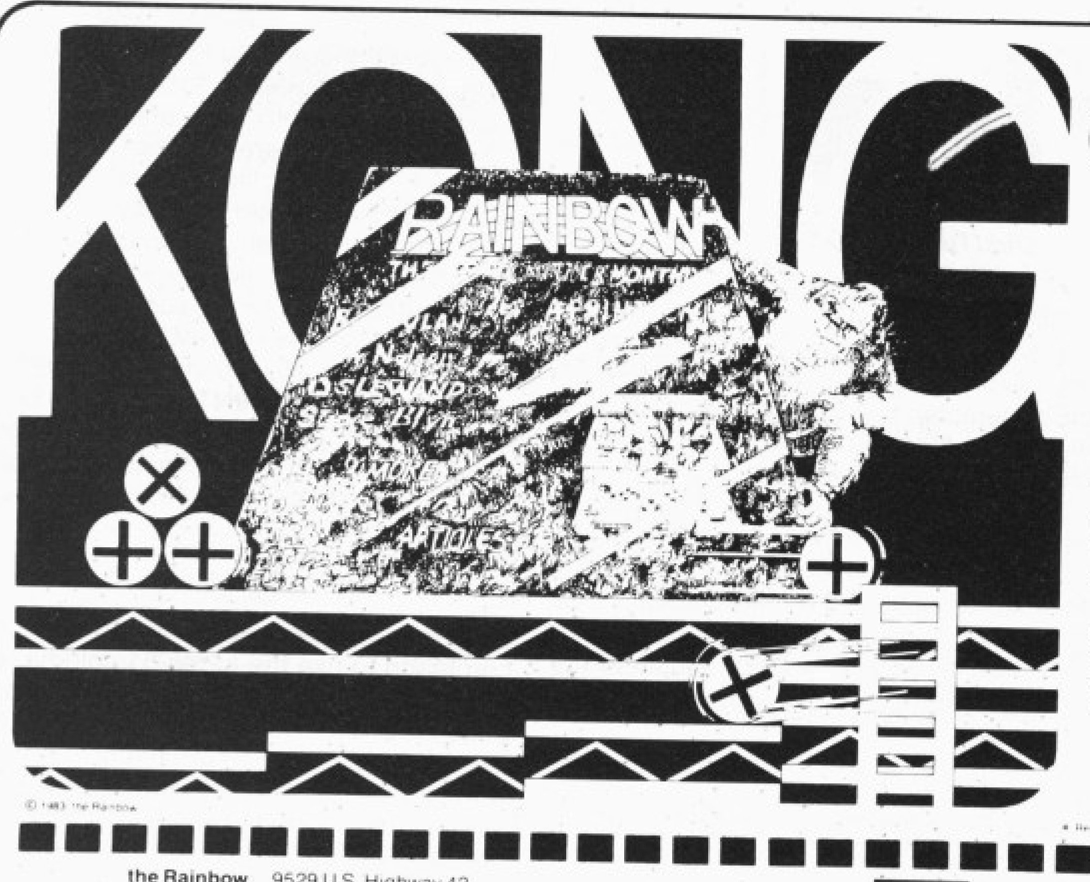
RMS will create the file to store the details for you, and then request the information in form-fill style — that is, you fill in a form on the screen for each record. Once this is done, you can search for and update records from the keyboard. RMS will also produce printed reports to the specification given in a file.

RMS consists of several modules, to create a new datafile, to input and edit the file, and to print the reports. All data is saved in the standard ascii format, so RMS files can be read by other Flex programs and languages such as Dbasic. RMS takes some getting used to, but once mastered it is a powerful record management system, if not quite a database.

Inevitably, Flex is going to be compared to OS9, and to be honest it comes off worst. Although it has more prewritten software than OS9, as an operating system it is much less powerful. There is no multitasking available, no piping of data to concurrent programs, and in certain ways it is more clumsy to use. Having said that, the Flex system disk is probably worth buying, just for the Assembler included on it, as this is certainly the most powerful I have seen running on the Dragon.

For the assembler/editor, Flex gets 10 out of 10, but for an operating system I would plump for OS9.

Flex disk & asm/edit	**£86.25**
Advanced Programmers guide	**£11.50**
RMS database	**£70.00**
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High-speed Compiler

***Brian Cadge** looks at the Dynafast compiler from Compusense*

IF THERE is one disadvantage of Basic, it's that it is slow compared to machine code. Of course, this is more than made up for by the fact that it is easier to learn and much easier to use and debug.

The reason Basic is slow is that each command is taken one at a time and "interpreted". This interpretation takes no account of whether the command is in a loop or whether a branch has been previously executed. For example, every time a branch is made to a line, that line is searched for starting at the first line of the program. Even if the program has jumped there previously, no note of its position is made. An interpreter is therefore in many ways inefficient.

Intermediate code

Alternatively, a language can be compiled into "Intermediate" code before running, using a Compiler. This "Intermediate" code is really a cross between Basic and machine code. All jumps are replaced by actual machine addresses and space for variables is reserved during compilation. Of course, a compiler cannot produce code that is as efficient as a true machine code program, however, compiled programs can run many times faster than interpreted ones.

The latest Basic compiler to appear for the Dragon is "Dynafast" from Compusense — available either on disk or on cartridge. The version reviewed here is on disk.

Dynafast is capable of compiling any working Basic program even including the Dragondos extensions, but to make best use of the advantages of a compiler some changes are necessary. The compiler offers both floating point numbers (as used by normal Basic) and integer numbers in the range −32768 to +32767. The advantages of using integers is that they only occupy two bytes per variable, whereas floating point numbers use 7 bytes. Integer variables are also accessed much faster than floating point ones as the 16 bit capabilities of the 6809 central processing unit are used directly.

So, to get the best speeds out of your compiled programs, integer variables should be used wherever possible (for example in for/next loops, counters and integer arrays). Dynafast requires that all integer variables are declared at the start of the program in comment lines, together with their storage address. For example, the line:

20 '030000 I J

tells Dynafast that the variables I and J are integers and are to be stored at addresses 30000/1 and 30002/3. Floating point numbers are only really necessary for large numbers and scientific applications, using SIN, LOG and so on and although these are supported by Dynafast, you will not gain any increase in speed by using them.

Once you have a working Basic program that you wish to compile, all that is needed is to load Dynafast and tell it the name of the program on disk (or tape) and the name of the output file (if you want to save the compiled program), also the mode of compilation. The options available are FAST (the program is compiled at full speed), NORMAL (the program is compiled with each line displayed with a short pause), STEP (the enter key is pressed after each line has been compiled) and PRINT (the output goes to the printer). Error messages and warning messages are clearly displayed during compilation and most programs compile in a matter of seconds.



The compiled program is run using EXEC and the break key is disabled (there is an option to have the break key checked if required). All integer arithmetic is fully compiled and floating point and other special commands (for example graphics) are semi-compiled — at runtime the ROM is called directly. The compiled program is put into memory where the original Basic one was, so this can no longer be used. Subsequent use of RUN will run the compiled program.

I tried six tests for speed using Dynafast, some were the example bench marks supplied on the disk, some were my own The results are shown in figure 1.

Clearly, the compiled programs run much faster when using integers. Using floating point operations as in BM5 offers very little time saving.

In addition to the compiler, two other programs are included on disk — Dynamiser and Dynaxref. Dynaxref analyses a Basic program producing a cross reference table showing variables and constants. Once loaded you simply load your Basic program to be analysed and type EXEC. There are several options available by adding a colon and characters after the exec, for example EXEC:AZ will only list variables (values whose first character is between A and Z), and EXEC:"" will only list string variables.

Dynaxref display

The display constantly shows what Dynaxref is doing and once completed the program can be listed with the variable table to either the screen or the printer. Clearly, this program is of little use to the Basic programmer, but used in conjunction with the compiler it can help you to decide what variables can be changed to integer ones in existing programs.

Dynamiser intelligently compresses Basic programs by the following methods:

1: Removing all spaces.
2: Deleting unnecessary REM's.
3: Combining several lines into one. This process will nearly always save you a lot of memory and will often speed up programs (although not very significantly).

When used on a program before compilation, the resulting compiled program also takes less memory. It is wise to keep a copy of the original program as compressed versions are very difficult to read however!

To summarise, Dynafast from Compusense is a very professional package, all programs are easy to use (Dynafast even has "help" pages for each step) and the manual supplied is excellent. The disk (or tape with cartridge) also contains some test and demo programs to get you started.

The major advantage of Dynafast over its rivals is its ability to handle ALL Basic commands, even if some are only directed to the ROM. This does mean that any working program can be compiled with very little alteration. The price is not cheap, £29.95 for Cartridge or Disk, which is twice the price of the Oasis compiler, but Dynafast offers more features. If you want faster programs and can't face machine code, then Dynafast should be your first choice.■

	Interpreter	Compiler	Test
BM1	1.46 secs	0.40 secs	FOR/NEXT
BM2	10.34	7.48	Counter loop
BM3	19.82	8.74	Integer calculation
BM4	17.12	5.28	5000 GOSUB's
BM5	65.10	64.18	Floating point calcs
BM6	16.58	15.64	Print a number (1000x)

Figure 1: the results of a speed test using Dynafast

DRAGON OPEN FILE

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Meander

From Keith David in Sussex

MEANDER is a strategy board game for two players. The object of the game is to form a continuous line from the top left corner of the board to the bottom right corner, or to force your opponent off the edge of the board.

To form the line, one of three possible pieces are placed at the end of the existing line. These pieces will cause the line to change direction, and sometimes to loop over itself. The program will automatically search for the end of the line, so in order to place a piece, it is only necessary to type in its identity letter. The three pieces are permanently displayed on the side of the board, for reference.

Program Notes

Lines

150-450 Draw the board.

630-770 Search for the end of the line. Line 770 checks whether the next space is vacant, and if it is not, causes a repeat search.

490 and 760 Check for the two different ways of ending the game.

When typing the program, all REMS may be omitted.

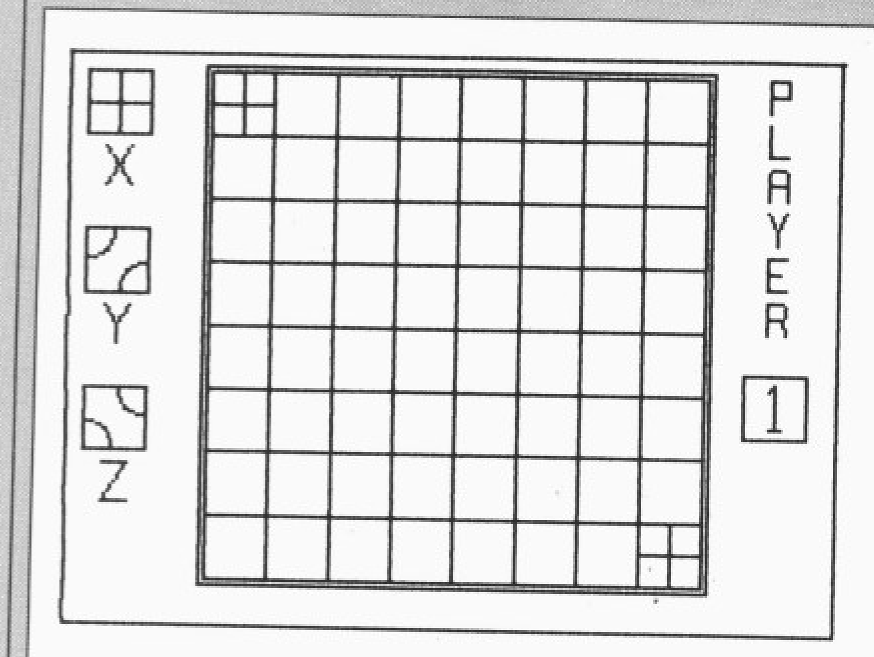


Fig. 1. The board at the start of a game.

```
10 REM MEANDER
20 REM INITIALIZATION AND TITLES
30 DIMX(0,11),Y(0,11),Z(0,11),A(9,
9)
40 P1$="BM229,122;R2NR2U14G2"
50 P2$="BM227,122;NR8U5E2R4E2U3H2L
4G2"
60 CLS
70 PRINT@73,STRING$(11,"*")
80 PRINT@105,"* MEANDER *"
90 PRINT@137,STRING$(11,"*")
100 FOR I=1 TO 1000:NEXT I
110 PRINT@224,"DO YOU WANT INSTRUC
TIONS? (Y/N)"
120 I$=INKEY$:IF I$="" THEN 120
130 IF I$="Y" THEN 890
140 REM DRAW BOARD
150 PMODE4,1:PCLS:SCREEN1,1
160 FOR Y=12 TO 112 STEP 50
170 LINE(8,Y)-(28,Y+20),PSET,B
180 NEXT Y
190 DRAW"BM18,12;D10NL10NR10ND10"
200 CIRCLE(8,62),10,5,1,0,.25
210 CIRCLE(28,82),10,5,1,.5,.75
220 CIRCLE(28,112),10,5,1,.25,.5
230 CIRCLE(8,132),10,5,1,.75,1
240 DRAW"BM14,36;M22,48;BM14,48;M2
2,36"
250 DRAW"BM14,86;M18,92;ND6;M22,86
"
260 DRAW"BM14,136;R8;M14,148;R8"
270 GET(8,12)-(28,32),X,G
280 GET(8,62)-(28,82),Y,G
290 GET(8,112)-(28,132),Z,G
300 FOR X=48 TO 208 STEP 20
310 LINE(X,12)-(X,172),PSET
320 NEXT X
330 LINE(46,10)-(210,174),PSET,B
340 FOR Y=12 TO 172 STEP 20
350 LINE(48,Y)-(208,Y),PSET
360 NEXT Y
370 PUT(48,12)-(68,32),X,PSET
380 PUT(188,152)-(208,172),X,PSET
390 DRAW"BM228,22;U10R6D5L6"
400 DRAW"BM228,36;NU10R6"
410 DRAW"BM228,50;U5NR6U4E1R4F1D9"
420 DRAW"BM231,64;U5NM228,54;M234,
54"
430 DRAW"BM228,78;NR6U5NR4U5R6"
440 DRAW"BM228,92;U10R5F1D3G1NL5M2
34,92"
450 LINE(221,105)-(241,125),PSET,B
```

```
460 REM PLAY
470 FOR X=0 TO 9:FOR Y=0 TO 9:A(X,
Y)=0:NEXT Y,X
480 A(1,1)=1:A(8,8)=1:X=58:Y=22:X1
=78:Y1=22:P=2
490 IF X1>208 OR X1<48 OR Y1>172 O
R Y1<12 THEN 820
500 ON P GOTO 510,520
510 DRAW"C0"+P1$+"C5"+P2$:P=2:GOTO
 530
520 DRAW"C0"+P2$+"C5"+P1$:P=1
530 I$=INKEY$:IF I$="" THEN 530
540 IF I$<"X" OR I$>"Z" THEN 530
550 ON ASC(I$)-87 GOTO 560,580,600
560 PUT(X1-10,Y1-10)-(X1+10,Y1+10)
,X,PSET:A((Y1-2)/20,(X1-38)/20)=1
570 GOTO 630
580 PUT(X1-10,Y1-10)-(X1+10,Y1+10)
,Y,PSET:A((Y1-2)/20,(X1-38)/20)=2
590 GOTO 630
600 PUT(X1-10,Y1-10)-(X1+10,Y1+10)
,Z,PSET:A((Y1-2)/20,(X1-38)/20)=3
610 GOTO 630
620 REM SEARCH FOR END OF LINE
630 ON A((Y1-2)/20,(X1-38)/20) GO
TO 640,680,720
640 IF X1=X+20 THEN X=X1:Y=Y1:X1=X
+20:Y1=Y:GOTO 760
650 IF X1=X-20 THEN X=X1:Y=Y1:X1=X
-20:Y1=Y:GOTO 760
660 IF Y1=Y-20 THEN X=X1:Y=Y1:X1=X
:Y1=Y-20:GOTO 760
670 IF Y1=Y+20 THEN X=X1:Y=Y1:X1=X
:Y1=Y+20:GOTO 760
680 IF X1=X+20 THEN X=X1:Y=Y1:X1=X
:Y1=Y-20:GOTO 760
690 IF X1=X-20 THEN X=X1:Y=Y1:X1=X
:Y1=Y+20:GOTO 760
700 IF Y1=Y-20 THEN X=X1:Y=Y1:X1=X
+20:Y1=Y:GOTO 760
710 IF Y1=Y+20 THEN X=X1:Y=Y1:X1=X
-20:Y1=Y:GOTO 760
720 IF X1=X+20 THEN X=X1:Y=Y1:X1=X
:Y1=Y+20:GOTO 760
730 IF X1=X-20 THEN X=X1:Y=Y1:X1=X
:Y1=Y-20:GOTO 760
740 IF Y1=Y-20 THEN X=X1:Y=Y1:X1=X
-20:Y1=Y:GOTO 760
750 IF Y1=Y+20 THEN X=X1:Y=Y1:X1=X
+20:Y1=Y:GOTO 760
760 IF X1=198 AND Y1=162 THEN 790
770 IF A((Y1-2)/20,(X1-38)/20)=0 T
HEN 490 ELSE 630
780 REM END TITLES
790 FOR I=1 TO 20:SCREEN 1,0:SOUND
 100,1:SCREEN 1,1:SOUND 150,1:NEXT
 I
800 CLS:IF P=1 THEN PRINT@71,"PLAY
ER 1 WINS." ELSE PRINT@71,"PLAYER
2 WINS."
810 GOTO840
820 FOR I=1 TO 20:SCREEN 1,0:SOUND
 100,1:SCREEN 1,1:SOUND 150,1:NEXT
 I
830 CLS: IF P=1 THEN PRINT@64,"PLA
YER 1 LOSES BY GOING OFF EDGE" ELS
E PRINT@64,"PLAYER 2 LOSES BY GOIN
G OFF EDGE"
840 FOR I=1 TO 1000:NEXT I
850 PRINT@448,"PRESS SPACEBAR FOR
ANOTHER GAME."
860 I$=INKEY$: IF I$="" THEN 860
870 IF I$=" " THEN 150 ELSE STOP
880 REM INSTRUCTIONS
890 CLS
900 PRINT@32," THE OBJECT OF 'MEAN
DER' IS TO  COMPLETE A CONTINUOUS
LINE FROM THE TOP LEFT CORNER OF T
HE BOARDTO THE BOTTOM RIGHT CORNER
, OR  TO FORCE YOUR OPPONENT TO CA
RRY THE LINE OFF THE EDGE OF THE
  BOARD."
910 PRINT:PRINT" SIMPLY TYPE IN TH
E LETTER OF   THE PIECE YOU WISH T
O PLAY TO   CONTINUE THE LINE."
920 PRINT@451,"PRESS ANY KEY TO CO
NTINUE."
930 I$=INKEY$:IF I$="" THEN 930
940 CLS
950 PRINT:PRINT" THE FIRST PIECE W
ILL BE PLACED ON THE SECOND SQUARE
 OF THE TOP LINE, SO PLACING PIECE
 'Y' AS   THE FIRST MOVE OF A GAME
 WILL   AUTOMATICALLY LOSE THE GAM
E."
960 PRINT@356," PRESS ANY KEY TO P
LAY."
970 I$=INKEY$: IF I$="" THEN 970
980 GOTO 150
```

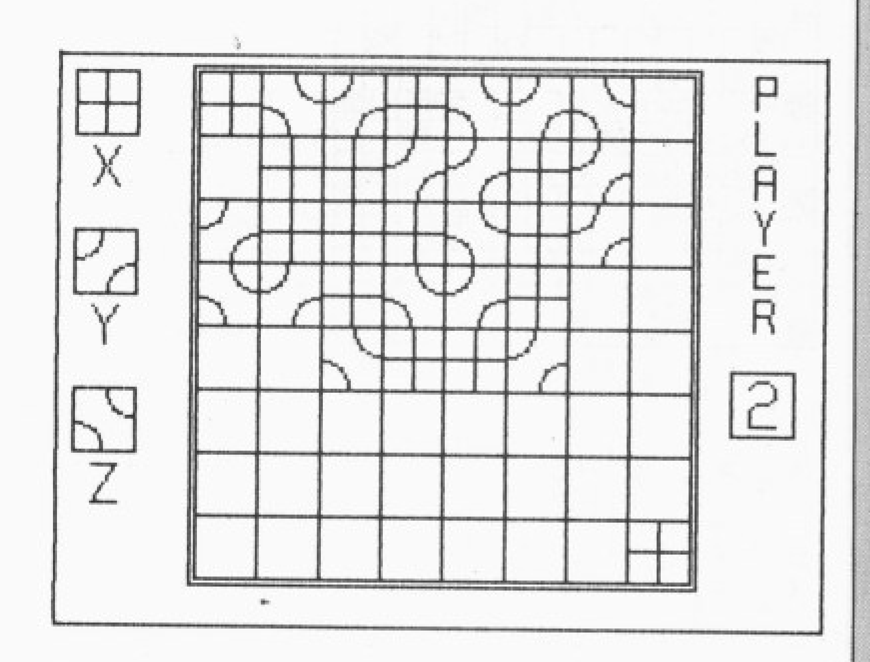


Fig. 2. A possible position after 29 moves. If Player 2 now plays piece 'X' he will lose. If he plays piece 'Y' he is bound to win.

Directory

From R Paterson in Leicester

THIS IS A fast-loading location program modelled on M McPartlin's program published in the July 1984 edition of *Dragon User*.

The program utilises arrays and data statements and in the listed format represents a blank master which can be loaded, then listed and the data statements amended to the required contents of a particular tape. The amended program is then saved at the start of the tape, and the first program on the menu is also saved.

The tape is then rewound, and the directory used to locate the second program by fast forward wind, and after this is saved the tape is again rewound and the directory used to locate for program 3.

The program is easily adapted to suit any size of tape, the numbers given being those found from experiment to suit a C-90 cassette divided into 18 segments to allow storage of most programs.

If a different sized tape is used the user can adapt the array size to suit the contents and amend the data lines to suit his programs.

A dummy save run using a stop watch can help determine what value to use for the locating value for fast forward.

Program notes

- 50-170 Sets up variables and fills arrays.
- 170-220 Displays first half of menu and allows selection.
- 300-380 Repeats process for page 2 of the menu.
- 410 Caters for selection of non-existent program by error or to locate tape for saving.
- 420-490 Supplies prompt messages and motor switching for fast winding.
- 510 Advises ready for saving.
- 520-560 Supplies prompts for loading program and enacting.
- 570-580 Data lines. The numbers are gained by experiment, providing six to eight seconds of tape winding per program at fast speed. The lines should be entered as shown and then details of times and properties added when used.

```
5 REM *************************
10 REM ***    DIRECTORY    ***
20 REM * WITH FAST FORWARD *
30 REM *  R.PATERSON 7/84  *
40 REM *********************
50 CLEAR 1000:DIM X(18),NP$(18)
60 FOR N=0 TO 18:READ X(N),NP$(N):
NEXT
70 CLS:PRINT@224,STRING$(32,CHR$(1
72));STRING$(12,"*");"DIRECTORY";S
TRING$(11,"*");STRING$(32,CHR$(163
))
75 FOR D=1 TO 1000:NEXT:CLS
80 C$="PLEASE PRESS FAST FORWARD K
EY"
90 D$="ON THE TAPE RECORDER"
100 E$="THEN PRESS THE SPACEBAR"
110 F$="PLEASE PRESS THE PLAY BUTT
ON"
120 G$="PLEASE WAIT"
130 H$="SEARCHING FOR"
140 J$="LOADING"
150 P$="SORRY NOTHING LISTED YET"
160 C=195:D=198:E=232
170 CLS
180 PRINTSTRING$(14,"*");"MENU";ST
RING$(14,"*");STRING$(32,CHR$(163))
190 PRINT@75,"PAGE 1 OF 2"
200 FOR N=1 TO 9:PRINT"      ";N;".
";NP$(N):NEXT N
210 PRINT"PLEASE SELECT ONE OF THE
 ABOVE"
220 PRINT"OR PRESS enter FOR NEXT
PAGE"
230 INPUT N$:N=VAL(N$)
250 IF N=0 THEN 300
260 IF N<1 OR N>9 THEN 270 ELSE 400
270 SOUND200,4:GOTO 190
300 FOR I=1088 TO 1479:POKEI,143:N
EXT
310 PRINT@75,"PAGE 2 OF 2"
320 FOR N= 10 TO 18:PRINT"     "N;"
.";NP$(N):NEXT N
330 PRINT"PLEASE SELECT ONE OF THE
 ABOVE"
340 PRINT"OR PRESS enter FOR PAGE
ONE"
350 INPUT N$:N=VAL(N$)
360 IF N=0 THEN 160 ELSE 370
370 IF N<10 OR N>18 THEN 380 ELSE
400
380 SOUND200,4:GOTO 310
400 REM * FAST LOCATION *
410 CLS:IF NP$(N)="---------" THEN
PRINT@D,P$:PRINT"PRESS 'C' TO CONT
INUE":PRINT"OR PRESS 'R' TO RETURN
 TO MENU" ELSE GOTO 450
420 A$=INKEY$:IF A$="" THEN 420
430 IF A$="R" THEN 170
440 IF A$<>"C" THEN 420
450 CLS:IF N=1 THEN 500
455 PRINT@C,C$;"     "D$,"     "E$
460 A$=INKEY$:IF A$=" " THEN 465 E
LSE 460
465 TIMER=0:MOTOR ON
470 CLS:PRINT@E,G$
475 PRINT@260,H$;" ";NP$(N)
480 IF TIMER/50>=X(N) THEN 490 ELS
E 480
490 MOTOR OFF
500 REM * LOADING *
510 CLS:IF NP$(N)="---------" THEN
PRINT@D,P$:FOR M=1 TO 1000:NEXT:PR
INT"TAPE POSITIONED FOR SAVING
   PROGRAM ";N:STOP
520 PRINT@C,F$,"     "D$,"     "E$
530 A$=INKEY$:IF A$=" " THEN 540 E
LSE 530
540 CLS:PRINT@D,J$;" ";NP$(N)
550 PRINT@E,G$
560 SCREEN 0,1:CLOAD
570 DATA 0, ,0,---------,5,---------
,10,---------,16,---------,24,-------
--,32,---------,40,---------,48,----
-----,57,---------
580 DATA 65,---------,72,---------,8
0,---------,87,---------,94,---------
,101,---------,107,---------,114,---
------,121,---------,130,---------
```

Alien

From S Azzopardi in Malta

THIS is a short program to draw an alien creature of a lovable nature. It is up to you to guess what it is.

```
5 REM*********DRAGONET*********
10 PMODE3,1:SCREEN1,0:PCLS1
20 DRAW"BM130,178;S16C4D2L11U2E1U3
E1U3H1U1H1L1H1L1H1L1U1L1U4H1U1H2U1
H1U2H1U2E2U1E6R1E1R10F1R1E1R5D1R2F
1R4G1D2F5D3G1D3G2D1L1G4L2G4D1G1D1G
1D2G1D5"
30 DRAW"BM-15,-30;E3R3F2D1G2L1G1L1
H1L1H1U1E1"
40 DRAW"BM+18,+1;U2E2R2F1R1D1F1G2L
3H3"
50 DRAW"BM-1,+10;U1H2G1H1L1G1L1G1L
1G1R1F1R1E1R2F1E1R2"
60 DRAW"BM+1,-10;H1G1D1F1E1U1;BM-4
,0;H1G1D1F1E1U1"
65 PAINT(120,160),4,4
70 DRAW"BM-7,-2;G2D2F1R1"
80 DRAW"BM+18,-1;L1H2U2E2"
90 PAINT(80,65),2,4
100 PAINT(150,55),2,4
110 DRAW"BM60,180;C4E5F1G5L2E3"
120 PAINT(62,179),4,4
130 CIRCLE(83,160),5,2
140 PAINT(83,160),2,2
150 FORI=1TO500:NEXTI
155 CIRCLE(83,160),5,4
160 PAINT(83,160),4,4
170 FORI=1TO500:NEXTI
180 GOTO130
```

Stock control

From Mark Bennett in Warwickshire

THIS IS a stock control utility program which uses data lines to read the information into arrays where they can be edited and sorted.

All instructions are included as REM statements. The arrays can be enlarged and more data added quite easily.

```
950 REM*************************
960 REM***** STOCK CONTROL *****
970 REM**** BY MARK BENNETT ****
980 REM******* 12/5/1984 *******
990 REM*************************
1000 REM BASIC STOCK CONTROL
1010 REM SN()=STOCK NUMBER
1020 REM DE$()=DESCRIPTION
1030 REM CP()=SELL PRICE
1050 REM IS()=AMOUNT IN STOCK
1060 REM IN()=INDEX FOR STOCK NUMB
ER
1080 GOSUB1300:REM INITIALISATIONS
1100 GOSUB 1600:REM PRINT OPTIONS(
MENU)
1130 PRINT"ENTER REQUIRED OPTION";
1140 INPUT OP
1150 IF OP<=0 OR OP>4 THEN 1100
1160 IF OP=1THEN GOSUB 1800
1170 IF OP=2 THEN GOSUB 3000
1180 IF OP=3 THEN GOSUB 4000
1190 IF OP=4 THEN END
1210 GOTO 1100
1300 REM SUBROUTINE INITIALISATION
S
1310 READ NR
1320 DIM SN(NR),DE$(NR),CP(NR),SP(
NR)
1330 GOSUB 1400:REM INITIALISE IND
EX
1350 GOSUB 1500:REMREAD STOCK FILE
1370 RETURN
1400 REM SUBROUTINE INITIALISE IND
EX
1410 FOR I=1 TO NR
1420 IN(I)=I
1430 NEXT I
1440 RETURN
1500 REM SUBROUTINE READ STOCK FIL
E
1510 FOR I=1 TO NR
1520 READ SN(I),DE$(I),CP(I),SP(I)
1530 READ IS(I)
1540 NEXT I
1550 RETURN
1600 REM SUBROUTINE PRINT OPTIONS(
MENU)
1610 CLS:REM CLEAR SCREEN
1620 PRINT"          SIMPLE STOCK FI
LE"
1630 PRINT
1640 PRINT"    1......DISPLAY FILE"
1650 PRINT
1660 PRINT"    2......EDIT RECORD"
1670 PRINT
1680 PRINT"    3......SORT FILE"
1690 PRINT
1700 PRINT"    4......END"
1710 PRINT
1720 RETURN
1800 REM SUBROUTINE DISPLAY FILE
1810 GOSUB 1900:REM DISPLAY HEADIN
G
1820 FOR I=1 TO NR
1830 R=IN(I)
1840 GOSUB 2000:REM DISPLAY RECORD
1850 NEXT I
1860 PRINT
1870 PRINT"PRESS RETURN TO CONTINU
E";
1880 INPUT A$
1890 RETURN
1900 REM SUBROUTINE DISPLAT HEADIN
G
1910 CLS:REM CLEAR SCREEN
1920 PRINT"NUMBER  DESC  COST  RSP
  IN STK
1930 RETURN
2000 REM DISPLAY A PARTICULAR RECO
RD
2010 PRINT SN(R);TAB(7);DE$(R);TAB
(14);
2020 PRINTCP(R);TAB(19);SP(R);TAB(
25);
2030 PRINT IS(R)
2040 PRINT
2050 RETURN
```

```
3000 REM EDIT A RECORD
3010 PRINT
3020 PRINT"ENTER STOCK NUMBER";
3030 INPUT ST
3040 GOSUB 3200:REM FIND RECORD
3050 IF NF=1 THEN 3010:REM CHECK R
ECORD EXISTS
3060 PRINT
3070 GOSUB 1900
3080 GOSUB 2000:REM DISPLAY RECORD
3090 PRINT
3100 PRINT"EDIT (Y/N) ";
3110 INPUT YE$
3120 IF LEFT$(YE$,1)="N" THEN RETU
RN
3130 GOSUB 3300:REM ENTER DETAILS
3140 GOTO 3070
3200 REM FIND RECORD ST
3210 NF=0
3220 FOR I=1 TO NR
3230 R=IN(I)
3240 IF SN(R)=ST THEN RETURN
3250 NEXT I
3260 NF=1:REM NOT FOUND
3270 RETURN
3300 REM ENTER DETAILS
3305 PRINT
3310 PRINT
3320 PRINT"DESCRIPTION";
3330 INPUT DE$(R)
3340 PRINT"COST PRICE";
3350 INPUT CP(R)
3360 PRINT"SELL PRICE";
3370 INPUT SP(R)
3380 PRINT"IN STOCK";
3390 INPUT IS(R)
3395 RETURN
4000 REM SUBROUTINE TO SORT THE ST
OCK FILE BY STOCK NUMBER
4010 FOR S=1 TO NR-1
4020 F=0
4030 FOR I=1 TO NR-S
4040 IF SN(IN(I))<=SN(IN(I+1))THEN
 4100
4050 REM SWAP
4060 X=IN(I)
4070 IN(I)=IN(I+1)
4080 IN(I+1)=X
4090 F=1:REM SWAP HAS OCCURED
4100 NEXT I
4120 IF F=0 THEN RETURN:REM YES AS
 NO SWAPS HAVE OCCURED
4130 NEXT S
4140 REM ARRAY IS NOW SORTED ANYWA
Y
4150 RETURN
9000 REM DATA
9100 DATA 10
9110 DATA8118,OS9,250,275,0
9120 DATA7899,FLEX,80.00,86.25,11
9130 DATA4321,MICROS,200,250,5
9140 DATA7788,SPRITES,16.00,17.25,
31
9150 DATA6969,64'S,210,225,12
9160 DATA5545,DRAGONS,129,149,8
9170 DATA2312,JOYSTK,15.00,19.99,1
4
9180 DATA1111,GAMES,7.00,8.00,250
9190 DATA8888,TAPES,.40,.55,1000
9200 DATA1234,DISKS,4.99,5.50,100
```



"I WOULD like to say how much I like the addition of the adventure column," says reader David Cochrane of North Shields. Thank you, David, you can write again. "But," he goes on . . . what's this? BUT? "But I would like to see a permanent Help feature."

Well, a Help feature rather depends on readers writing in to ask, for help, and in the first month or two we didn't receive too many letters. But, now they're starting to come in quite regularly and we'll be happy to try and deal with both hints and helps. So, this month's column will be devoted mainly to the readers, including one who's bravely submitted his own adventure and asked for "constructive criticism". Would I give any other kind?

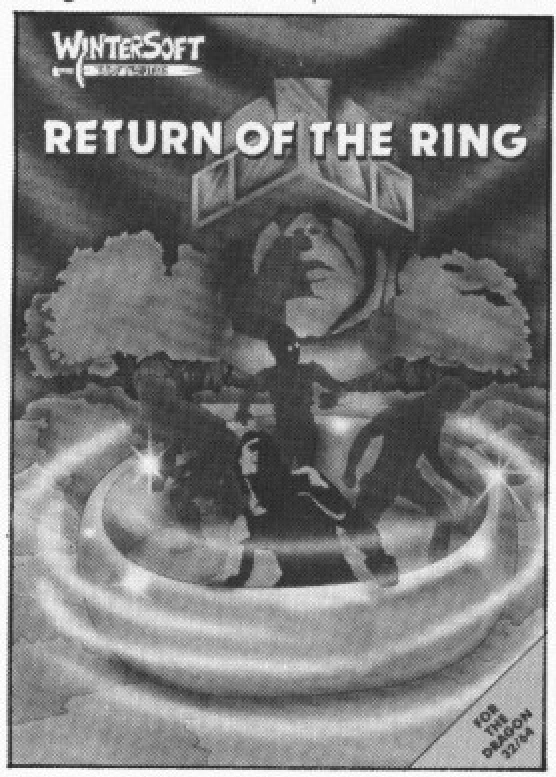
Having requested the Help column, David Cochrane offers to set the ball rolling by helping any readers who are stuck in Wintersoft's *Return of the Ring*, which he recently completed and which he also highly recommends. If you need help, send a stamped addressed envelope to David at 115 Grey Street, North Shields, Tyne and Wear NE30 2EG. In fact, if writing to anyone send an SAE — and that includes me! Going to my local Post Office to buy vast amounts of stamps is an adventure in itself, but one I prefer to avoid. It leads to things like STAMP FOOT, EXAMINE WATCH and KILL IDIOTS.

Back to thoughts of co-operation, though, and a heart-felt plea from S Harrison, also of Tyne and Wear: "I am currently trying to complete Dragon Data's *El Diablero* and it's driving me up the wall. I have planted the magic bush, taken the eagle's feather, have done what the talking threads told me but I cannot find any cactus blossom to dip my magic twig in!"

Up the wall

If anyone has successfully completed *El Diablero* then they can win themselves several friends for life as this seems to be one of the most puzzling adventures. Don't turn to me for help because I only got a copy of it this week . . . that's my excuse, anyway. If you wish to help S Harrison, then the wall he or she is being driven up is at 15 Pembridge, Oxclose, Washington, Tyne and Wear NE38 0LG.

I'd like to thank Adam Atkinson for my copy of *El Diablero,* at least I think I'd like to thank him as all I've done so far is wander aimlessly round a desert in the one session I had with the adventure. Adam is obviously a seasoned adventurer, having completed *Madness and the Minotaur, Ring of Darkness* and *Return of the Ring,* but he too is stumped by *El Diablero,* where he can't stop the mother eagle killing him, and doesn't know what the snake, lizard and crow are for. He also can't get the boards off the door in *Black Sanctum,* so D-I-Y hints to Adam at F2b Bishop's Hostel, Trinity College, Cambridge CB2 1TQ. I completed *Black Sanctum* myself in one long sitting, but didn't keep any notes and now can't remember how I did get the boards off the door. Memo to myself: always keep notes and maps!



B Buck of 31 Westlecot Road, Swindon, Wilts would like to know how to cross the water and mountains in *Ring of Darkness,* while Steve Barritt of 126 The Medway, Daventry, Northants NN11 4QX offers help to anyone stuck in *Madness and the Minotaur.*

There are a couple of readers looking for help, but I can't try and fix them up without their full addresses. Kieran Cleary wrote from County Tipperary, looking for help on Dragon Data's *Cimeeon Moon,* but I can't read Kieran's address clearly . . . write again, Kieran. And write again Lionel Depeux of Asnieres/Seine in France. I replied to Lionel's long letter, but it was returned to me as his address was incomplete. Lionel's amusing letter complained that his mind was falling to pieces thanks to . . . what else, *El Diablero.* His main problem is that he can't leave the desert, have dipped his twig in "a certain place". If anyone can help Lionel, or is just interested in getting in touch with a French adventurer, write to me and I'll forward the letter on when I hear from Lionel.

N Smith of 25 Allenby Road, Maidenhead, Berks SL6 5BE was stuck in several places in Salamander's *Franklin's Tomb.* N Smith's tombs were the Aquarium and the Pit, and he or she was also unable to open the safe. I've passed some help on to this reader, courtesy of Lucy Parker of Salamander, who said she was looking forward to seeing her name in print.

No frills

Salamander do offer help sheets for all their adventures, and if you're feeling starved of new games then they have produced 'no frills' versions of two adventures. For £5 each you can have versions of *Franklin in Wonderland* and *White Cliffs of Dover,* though they come without covers or instructions. I don't think that matters too much, and I'll be having a longer look at one of those next time, when there's a little more space.

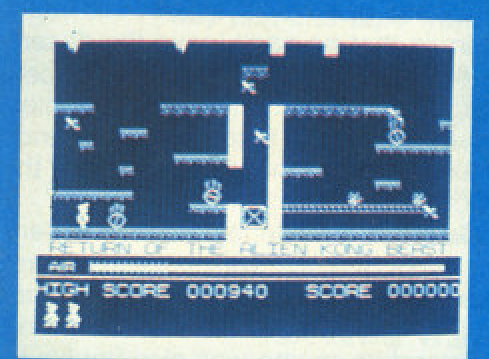
On another topic, what chance has a reader got of marketing a Dragon adventure? Tony McGhee has written *The Mary Celeste.* There's a very nice loading screen, with a quick burst of organ-like music, and you begin on the bridge of a deserted ship.

There are some good routines included, such as the pirate ship which attacks at one point, giving you just 12 moves to defend yourself — this has you running around looking for gunpowder, cannons, pistols . . . anything! You should eliminate some of those sudden death routines, though, Tony. If you're interested, contact Tony at 54 Arundell Drive, Barnsley, S. Yorks S71 5LE.

And if you're interested in asking for or offering help then contact me at *Dragon User,* and we'll deal with as many of the letters as space permits. Next month a look at those Salamander titles, and the problems of Wigan's Samuria. ■







MANIC MINER

Miner Willy, while prospecting down Surbiton way stumbles upon an ancient, long forgotten mineshaft. On further exploration, he finds evidence of a lost civilisation far superior to our own, which used automatons to dig deep into the Earth's core to supply the essential raw materials for their advanced industry. After centuries of peace and prosperity, the civilisation was torn apart by war, and lapsed into a long dark age, abandoning their industry and machines. Nobody, however, thought to tell the mine robots to stop working, and through countless aeons they had steadily accumulated a huge stockpile of valuable metals and minerals, and Miner Willy realises that he now has the opportunity to make his fortune by finding the underground store. In order to move to the next chamber, you must collect all the flashing keys in the room while avoiding nasties like Poisonous Pansies and Spiders and Slime and worst of all, Manic Mining Robots. When you have all the keys, you can enter the portal which will now be flashing. The game ends when you have been 'got' or fallen heavily three times.

This is a Computer and Video Games Hall of Fame Game.

Available on the Dragon 32/64

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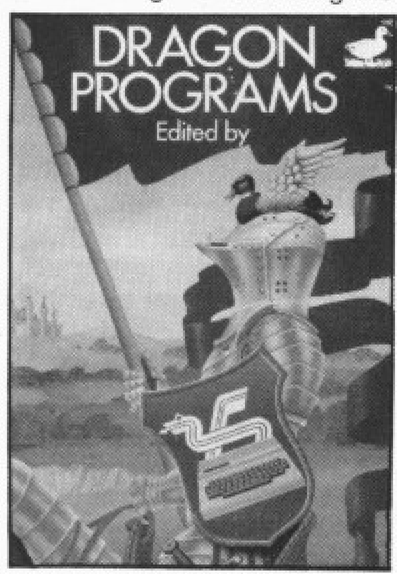
Bookbytes

Send books for review to *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Book: *Dragon Programs*
Author: *Nick Hampshire*
Publisher: *Duckworth*
Price: *£6.95*

'SOMETHING OLD, something new . . .' runs the old adage, which might also be said in some respects to reflect this collection of 20 routines for the Dragon 32. Certainly, there is variety here. Whatever your taste, programmer John Alishaw provides a wide assortment of material, with old favourites such as *Hangman* lying cheek by jowl with the newer style space invaders.

In some respects the book is a little too general, and in trying to cover such a wide range of material some of the individual programs tend to be a little on the sparse side, an impression which is not helped by the unusual 'sideways' format in which the entire book is printed. This is done, presumably, to allow the full 80-character wide printout of the listings to run along the length of the page, but with the majority of the program lines less than half this length, there tends to be a predominance of white paper.



Overall, if there's something that appeals to you — fine! From a personal point of view, I always feel that, for example, text adventures in BASIC entered in from the keyboard are never really satisfactory, probably because in typing them in you get a fair idea of the alternatives, and any sense of 'surprise' is consequently missing. I would also have liked to have seen programs using the random function utilising an INKEYS/TIMER routine to achieve more random 'randomness', and so avoid the same sequence being selected when starting from 'cold'.

Minor points, maybe, but it is these which tend to let the book down. There are magazines full of listings, and a book, therefore, should just have that little extra attention to detail.

Gordon Lee

Book: *A Pocket Handbook for the Dragon*
Authors: *Pete Gerrard and Danny Doyle*
Publisher: *Duckworth*
Price: *£2.95*

WHENEVER I am programming I find nothing more irritating than forgetting a memory location, character code, or special POKE. I have often contemplated the idea of gathering all the useful bits from various magazines together to form a sort of 'Handbook.'

The job has been done for me by Messrs Gerrard and Doyle who have produced possibly the most useful book the Dragon programmer will ever buy. At £7 it would represent good value, at £2.95 it's a gift!

Within the covers lie 90 pages of very useful information for programmers including ASCII tables, character codes (for M/C users), formulae for hyperbolic functions, details of the connections to the centronics, cassette and joystick ports, the complete 6809 instruction set, a comprehensive memory map, and more of the same. The information is arranged in alphabetical order, is spaced out and presented clearly and attractively.

But, the book does have its flaws. For every useful thing in the book, another equally useful thing has been left out. For example, where are the memory addresses on the "Print & Grid", or the pokes enabling one to get into the 14 graphics modes so tantalisingly described? Where are details of vectors for the random number ROM routine, or the routine to print the NUMBER in the D-register? Where is any reference made to paging, or how to PCLEAR 1 after having used PMODE 4?

The book is also printed in a very strange way — it is almost like a series of equally sized photocopied sheets bound together. Some of the pages are professionally printed, some of them are dumped from a Dot-Matrix Printer, some are even handwritten for reasons known only to the authors.

But, despite these faults, the book is still a must for any Dragon owner who wishes to progress further than writing "Guess the Number" and "Maths Quiz" programs and will always have a place beside my Dragon. Buy it.

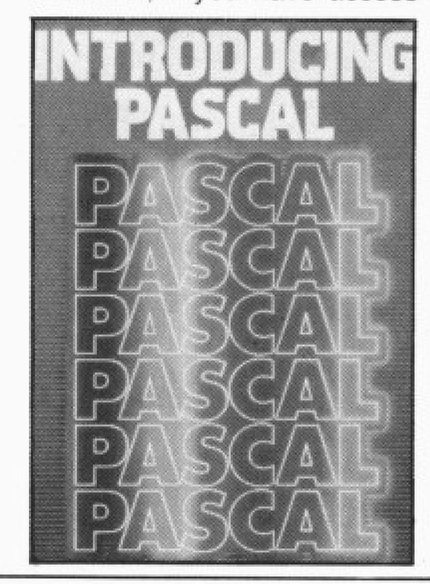
Jason Orbaum

Book: *Introducing Pascal*
Author: *Boris Allan*
Publisher: *Granada*
Price: *£6.95*

BORIS ALLAN is a well known author in microcomputing circles, and his latest book, *Introducing Pascal* is a very well presented Pascal tutor. As Pascal is a 'structured' language, Allan has tried to teach it in a 'structured' fashion and I think the approach works well.

The book starts by giving the 'feel' of Pascal, the reasons behind its development, and the basic concepts involved in the language. Later chapters go into more detail about the language, ending up with a look at Pascal's future prospects. There are several useful appendices including one about Modula-2, the language derived from Pascal, and one describing P-Code, which is used to implement many popular Pascal compilers.

Pascal is not a language which can be learned without trying practical examples on a computer. Dragon owners are particularly badly served in this respect, because unless you have Flex or OS9, there isn't a single proper Pascal compiler on the market. However, if you have access to an implementation somewhere, and you want to learn Pascal, this is a very good book to learn from. It is written in readable style, and there are lots of examples. At just under £7 it must represent excellent value for money — what more can I say?



David Rowntree

Book: *The Beginner's Guide to Forth*
Author: *David Johns*
Publisher: *Interface*
Price: *£2.95*

IF YOU ask the ubiquitous 'man in the street' to name three computer languages they will give the standard reply BASIC, PASCAL and FORTH. FORTH is rather different from the other languages as it has no line-by-line program structure, concentrating instead on the build-up of a vocabulary, from basic (no pun intended) beginnings.

A FORTH program looks daunting to the average BASIC programmer, partly because of its structure and partly because of the fact that it uses Reverse-Polish notation.

Several FORTH compilers are now on the market for the Dragon (with such imaginative names as "Dragon-Forth") and this book, by David Johns, although not Dragon specific provides a very good introduction to the language. But sadly, not a perfect introduction. Although most people will find it very easy and quite relaxing to read, others will be driven to distraction by this 'Blue Peter' approach to programming.

The text is very large (and yet the book only covers 85 pages, hmm . . .) and the listings are all straight printer dumps and therefore theoretically perfect.

The appendicies are the most useful part of the book, containing as they do, a complete, FORTH dictionary, a list of the standard FIG-FORTH error messages, and the obligatory ASCII character set!

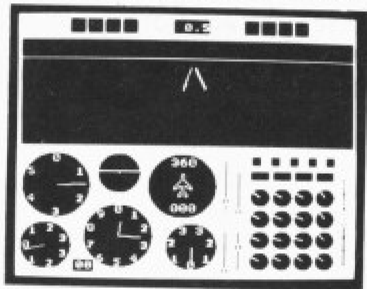
This, I'm sorry to say, is one of the books that the FORTH beginner will have to see before buying. I would advise any interested parties to read the first two chapters in the shop and then make their choice.

Jason Orbaum

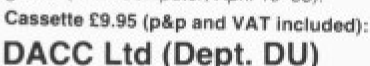
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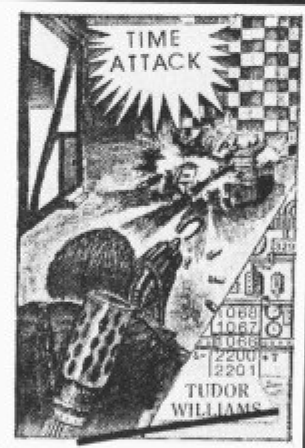
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Dragon Answers

Program entry points

THANK YOU for the advice and helpful routines you have provided in *Dragon User*. I use your screen inverter frequently.

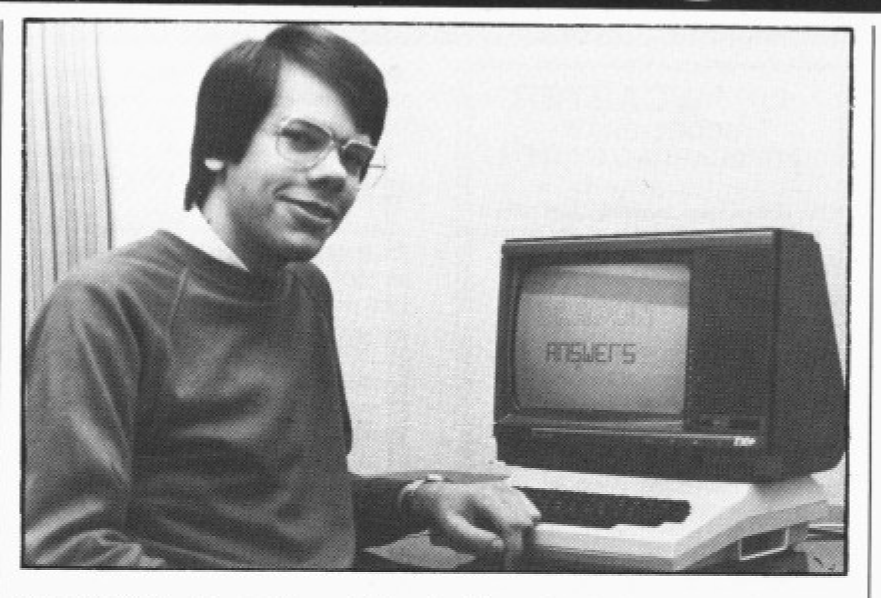
Your answer in the October issue, dealing with the saving of Hi-res pictures, prompted me to ask how one decides on the 'program entry points' for a CSAVEM entry? Published programs vary in their approach a great deal — entry points can be found inside programs, at their start, or outside programs altogether. Is it a case of 'think of a number' or are there clear rules to be followed?

Bill Gathercole
Lincoln
Lincolnshire

THE ENTRY address of a machine code program is like the line number in a RUN command — usually this is left out, meaning run the program from the start, but occasionally RUN 100 might be used to mean run the program from line 100. The entry address of a machine code program is often the start of the program itself, but it too can be an address within the program. Unlike the RUN command, this address must be specified in the CSAVEM command, as this address becomes the default EXEC value when the program is reloaded.

You may often see the entry address given as 33649 when the data saved is not real machine code, for example it might be a graphics screen. 33649 is a Rom routine which simply returns the OK prompt and is included for safety reasons.

The idea that the entry address is the number of bytes to be saved is wrong. The confusion is caused by the original Dragon manuals, which stated this.



OS9 printer escape codes

I AM hoping you will be able to help me with a couple of queries that I have on using OS9 on my Dragon 64. My problems are: a) How do I enter Printer Escape Codes through OS9? b) How do I configure RMS/STYLOGRAPH to run on my printer which is an NEC 8023BE-N? c) When using MAILMERGE to print multiple copies, how do I stop the printer from form feeding a complete blank page in between each page of print?

J A Leggett
Clifton
York

YOU CAN send printer escape codes by using the DISPLAY command and redirecting the output to the printer. For example, to send the sequence, 27,16,7,9 you would use:

DISPLAY 27,16,7,9 >/P

You can configure Stylograph to any printer by preparing a textfile called STYPS in the STY directory. This should contain the ascii code, followed by the number of increments required for the width of the character, followed by the sequence of characters required to print the ascii character. There should be one set of entries per line. Type LIST /DO/STY/STYPS to get the idea.

As far as I know you cannot easily stop mailmerge from leaving a blank page between copies.

Pclear—not so clear

I HAVE been having a lot of difficulty with the use of PCLEAR. If the computer has been left on for any length of time, the use of PCLEAR 1, PCLEAR 2 and PCLEAR 3 is always followed by an Error message. PCLEAR 4-8 are accepted normally. This also applies if I have used the words PCLEAR 1, etc.

However if I switch the machine off to cool down before loading a program, there is no problem. I normally keep the computer on all the time and find this particular bug a big nuisance.

W Jenkyn Jones
Helmsville
Crewe

I DON'T think there's anything wrong with your Dragon. The trouble with the PCLEAR command is that it will not let you release graphic pages that are in use in the current Pmode.

At power up the default Pmode setting is 0, which uses one page, so PCLEAR 1 is accepted, but after having used PMODE 3 or 4, all four pages are in use, and you cannot PCLEAR to a value less than four. The solution is to use a PMODE 0,1 command before the PCLEAR statement, which should solve any problems.

Robots on the march

I AM making an interface for a robot. I have the electronics expertise, but have no idea how to connect it to my Dragon. Could you please tell me which individual pins in the cartridge port are used for what and how to access them. Given this information, I should be able to write the software.

Any enlightenment would be of great help.

R Andrews
Wakefield

PS: The robot is a Prism Memoconn Crawler if that is of any use.

I THINK you would find it easier to control the robot from the printer port, the pin connections for this are given at the back of the Dragon manual.

However, these are the pin connections for the cartridge port in order from 1 to 40:

−12v,+12v,HALT,NMI,RESET,E,Q,CART,+5V
D0,D1,D2,D3,D4,D5,D6,D7,R/W,A0,A1,A2,A3,A4,A5
A6,A7,A8,A9,A10,A11,A12,CTS,GND,GND,SND,SCS
A13,A14,A15,SLENB.

Fulfilling your potential

I USE a Sekosha GP-100A Mark II with my Dragon and find it serves my needs well. I am, however, anxious that I am using it to its full potential. I have the Owners' Manual but can't claim to understand much of it!

Do you know of any other literature or articles that might explain in detail that even I could understand how control codes work, how to use the printer to its full with software etc?

G Moore
Tattershall
LIncoln

I SUGGEST you take a look at the December 1983 issue of *Dragon User* (available as a back issue). This included an article on the GP-100A for screen dumps from the Dragon.

Power pack burn out

MY SON is the owner of a Dragon 32. Unfortunately, he is unable to use it at the moment because the power pack is, we believe, burnt out.

Could you please tell me if it is possible to purchase a new power pack. We have been told the cost of repairs to ours would be £35 plus.

A Booth
Balderstone
Blackburn

YOU CAN purchase a new power pack for your Dragon from Touchmaster for £7.90 including p&p. The address is Touchmaster Ltd, Kenfig Industrial Estate, Margam, Port Talbot, W Glam, SA13 2PE.

Before you part with your money, it is worth checking your Dragon with a friend's power pack to make sure it is not the computer itself which is faulty.

Post Script

Finally, a tip — you can have a machine code program run on loading using the RUN command, eg RUN "PROG.BIN". It is not made clear in the manual that RUN will operate with both Basic and machine code files.

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***Gordon Lee** presents another mind-boggling problem for puzzle solvers*

ONE OF THE more frequently encountered terms in the field of recreational mathematics is that of 'triangular' numbers. These, together with their more familiar neighbours, the '**square**' numbers form the basis for a number of interesting problems.

If we take a single coin (or counter) and place it on the table we have the first 'triangular' number. Now if we place two more beneath it to form an equilateral triangular pattern, the three coins produce the second 'triangular' number, 3. By adding extra rows of coins in the same general pattern we can extend the pattern **ad infinitum.** Clearly, the series of numbers is generated by the formula T = 1 + 2 + 3 + 4 + 5 + 6 + . . . the first six terms being: 1,3,6,10,15 and 21. Ten-pin bowlers will recognise the '10' patterns as the layout of pins on the bowling alley, and snooker players the '15' as the arrangement of the red balls at the commencement of the game.

There are a number of properties of triangular numbers that can prove helpful when it comes to solving puzzles involving these numbers. For example, a triangular number can only have a digital root of 1,3,6 or 9. Also, the sum of any two consecutive triangular numbers is equal to a perfect square.

A perfect square can also be obtained from the expression $8t + 1$ where t is any triangular number. This forms the basis of a useful test to determine if a given number is triangular or not. If eight times the number plus one is a perfect square, then the number is triangular.

Finally on the subject of triangular numbers, the nth number of the series can be found from the equation $N = n(n+1)/2$.

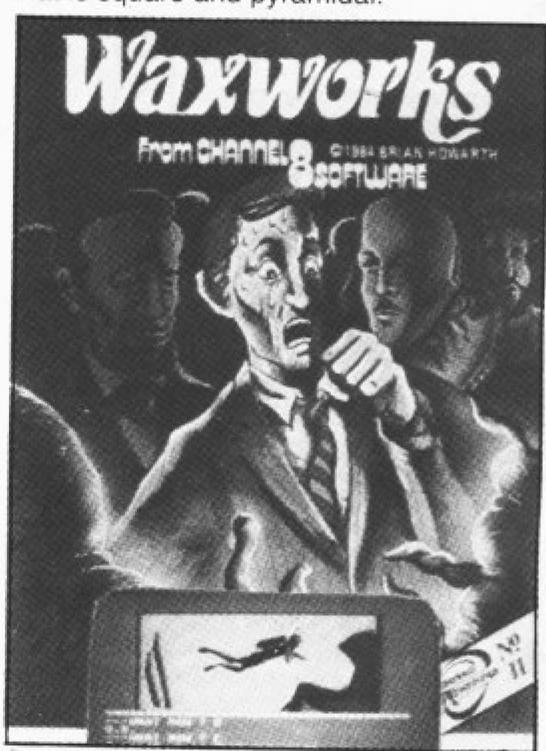
Infinite number

The 'square' numbers are too well known to need further explanation except to consider them in relation to the triangular numbers. For example, are there any numbers that are **both** triangular **and** square? In fact, there are an infinite number of them, the first seven being: 1,36,1225,41616,1413721,48024900 and 1631432881. After this the number becomes very large indeed!

We ought now to look at the three-dimensional counterparts of triangular and square numbers — the tetrahedral and pyramidal numbers respectively. Both of these numbers might be best visualised in the form of, for example, a stack of tins in a supermarket display. So, if they were arranged on a 'triangular' base they would be 'tetrahedral' in form. Each layer, counting down from the apex would consist of a successive triangular number (1,3,6,10,15,21) and by taking the **cumulative** total of each layer — again from the top we would arrive at the tetrahedral series of numbers 1,4,10,20,35,56 etc. Similarly, if the structure were built on a square base, each layer being successive **square** numbers, we obtain the **pyramidal** series: 1,5,14,30,55,91 etc.

Having considered earlier numbers that are both triangular and square, we can see from the few numbers already listed other inter-relationships between some of these series. For instance, 10 is both triangular and tetrahedral, while 55 is both triangular and pyramidal.

Unfortunately, not all of the inter-relationships are as easy to find. For example, it is unlikely that there is a number, apart from the trivial case of unity, that is both tetrahedral **and** pyramidal. If one exists, it will be incredibly large. Similarly, it has been proved that apart from 1 there are only two numbers that are both square and tetrahedral, and only *one* that is square and pyramidal.



This month's competition involves some coloured wooden blocks. I have a large collection of painted cubes of wood, coloured red, blue and green. The red blocks alone can be arranged into a square formation *or* a tetrahedron. If I add the blue blocks, the red and blue together can also be arranged into a larger square or into a pyramid. Finally, by adding the green blocks, the entire set can form a third square, and again can be built into another tetrahedron.

How many of each colour have I?

Prize

CHANNEL 8 Software is offering 20 readers the chance to win *Waxworks*, its latest adventure for the Dragon.

November winner

THE SOLUTION to the November puzzle is that there are 17 chances out of 25 that a white counter will be picked. Only 17 people sent in the correct solution, but each winner receives a copy of Melbourne House's *Horace goes Skiing*. The winners are: Brian Hughes of Hounslow, J Fettes of Kent, D Faulkner of Pontypridd, Patrice Gangrard of France, Jan Chakesa of Denmark, N Quinin of Nothumberland, Colin Silvester of Rochdale, Paul Priestland of Lechlade, A Dugdale of Salford, W Jagodie of Coventry, M Armitstead of Basingstoke, S Bakker of Holland, Paul Derwent of Mossley, P Sapiro of Liverpool, S Hutchinson of Chorley, M Stentiford of Devon and P De Gruchy of Jersey.

Rules

TO WIN a copy of the game you must show both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. Please do not send in a cassette containing the answer. As a tie-breaker complete the following sentence in 15 words or less: "I would like a waxwork Dragon because . . . "

Your entry must arrive at Dragon User by the last working day of February. The winners and the solution of the quiz will be published in our May issue. Entries will not be acknowledged and we cannot enter into correspondence on the result.

St. George now has two choices!

Red or green will slay the Dragon

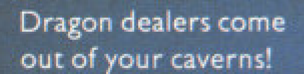
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